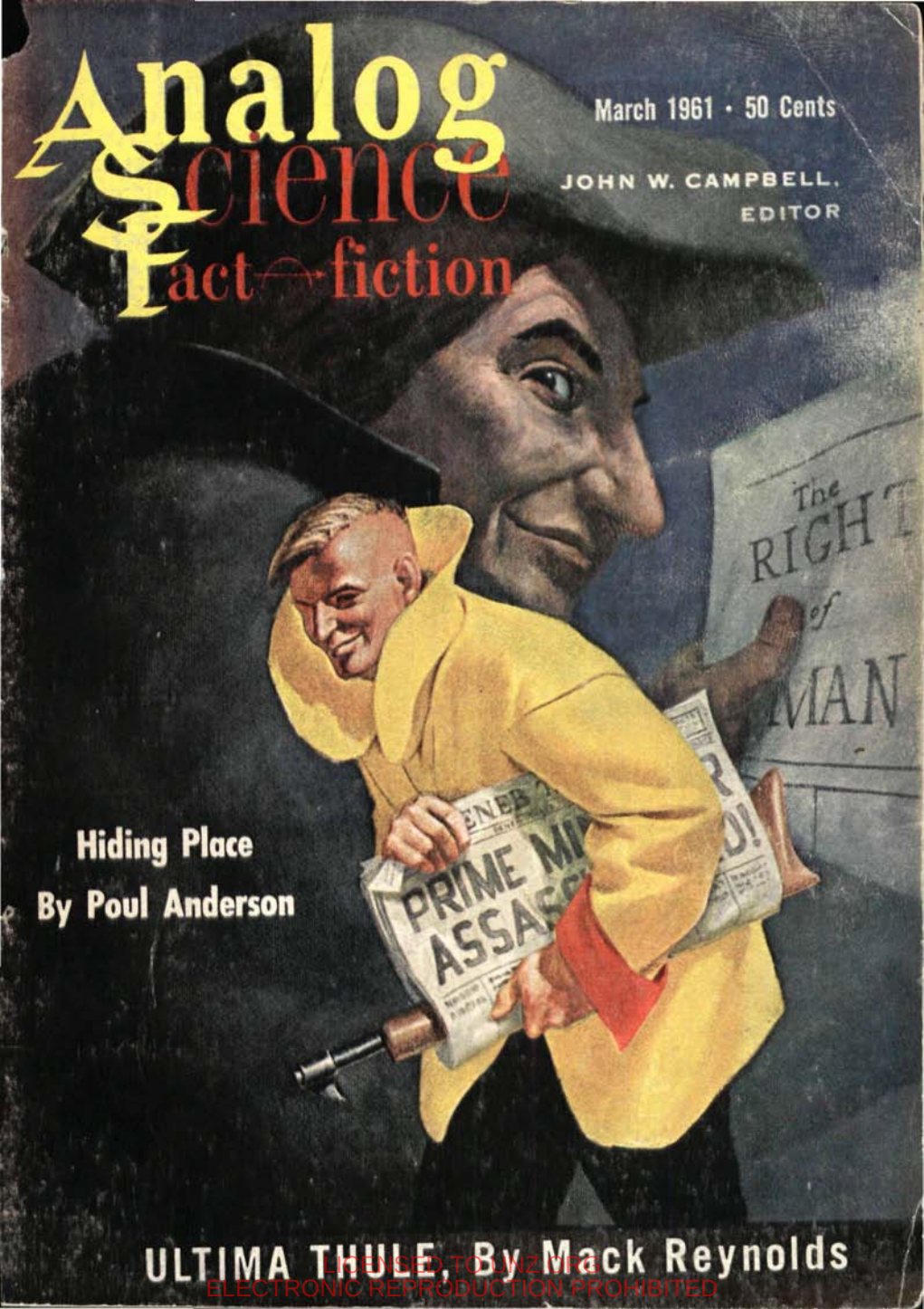

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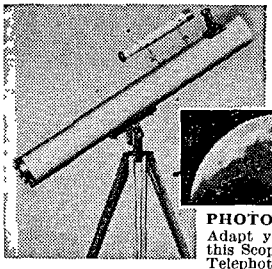

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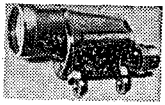

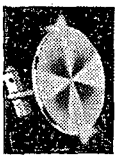

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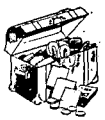

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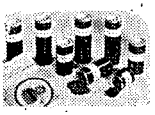

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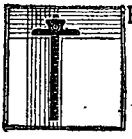
CONSTITUTION



THE standard operating procedure for the Utopia-inventor is to describe his Utopia in terms of how he *wants* it to work. That is, he describes what he considers the goal-ideal of a society should be, and how he thinks that goal ideal will be achieved, in terms of how happy, healthy and wise citizens of Utopia co-operate beautifully to produce wonderful music together. Usually, there's no crime, because, says the author, in so perfect and happy a state no one wants for anything.

There is, however, an astonishing lack of discussion of the legal code on which these Utopias are based—the machinery of the social system is always happily hidden out of sight, and we don't need to look at it, because it works so nicely.

I've seen—and in a college textbook, at that!—a definition of the Socialistic System that read, in essence, "Socialism is a system assuring maximum distribution of the wealth of the society to the productive citizens . . ." That makes things real nice for Socialists; if that is the definition, then, by definition, they're bound to be right! If a system doesn't "assure maximum distribution of the wealth" then, it isn't Socialism, and any system that does achieve that obviously desirable goal is, by definition, a version of Socialism, and see, doesn't that prove Socialism is the ideal system?

It's been standard operating procedure to define Utopias in just such terms—and consider the legal code required to achieve them "a mere detail." Something gross-materialist, anti-idealist, conservative—or whatever opprobrious term happens to be current—people throw up as a deliberate effort to becloud the real, important issues.

Now Utopias always have been in the legitimate field of interest of science fiction; let's try, in readership assembled, rather than in congress assembled, to see what the whole group of some 100,000 readers can come up with in the way of designing a mechanism for a Utopian culture! This editorial is not intended as an Answer to the Ques-

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FOR UTOPIA

tion; it's intended to start the ball rolling; Brass Tacks can be the forum. What we're seeking is to pound out a Constitution for Utopia, defining a system that will generate the cultural system we want—*not* a eulogistic rhapsody about how glorious it will be when we get it done.

As a locale, let's consider that the Utopian culture is to be started among the people living in, on, and among the asteroids, about seventy-five years hence. (The locale is not critical, of course; the machinery of government is designed for human beings; what devices they use, where they live, is of secondary consequence.)

To begin with, recognize that we are NOT going to get a culture that is the perfect heart's-desire system of every inhabitant. That is called Heaven.

What we'll have to do is seek an *optimum* culture. It's an engineering problem, and should be approached as such. Many a time an engineer would *like* a material as transparent as glass, as strong and tough as steel, capable of resisting an oxidizing atmosphere at 2500°C., as light as foam plastic, and as cheap as cast iron. *And* as conductive as copper.

The useless engineer is the one who says, "See! They won't give me what I need! It's impossible to solve the problem!" The engineer who *is* an engineer starts figuring the optimum balance of characteristics that will yield not a perfect-ideal, but a thing that will work, and work with a reliability level high enough to be useful for the task at hand.

Now one of the first and broadest questions usually raised is, of course, "What form of government should it be?" Monarchy? Democracy? Oligarchy? Communism?

That question, I suggest, is of no importance whatsoever! Utopia can be a Communism, an Anarchy, or an Absolute Tyranny; the matter is of no real consequence.

My evidence is quite simple: Traditionally, benevolent tyranny is the optimum form of government . . . if you can just assure that the tyrant is, and remains, benevolent. Also, traditionally, both Heaven and Hell are absolute monarchies.

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Wise, benevolent, and competent rulers can make *any* form of government utopian—and fools who are benevolent, kind, and gentle, can turn any form of government into Hell. Scoundrels need not apply; scoundrels normally have a reasonable degree of competence, and will, for their own benefit, maintain a higher standard of efficient government than will benevolent fools. Witness the incomparable mare's-nest of the Congo, which has resulted far more from the blundering of fools than machinations of villains. Villains wouldn't have loused things up so completely; nobody can make anything out of the idealistic shemozzle the Congo's become.

Anarchy is government-that-is-no-government. In other words, each, individual citizen is his own ruler. Given that all the citizens are wise, benevolent, and competent, anarchy will produce a Utopia. Unfortunately, this requires that each citizen *be in fact,* not simply in his own perfectly sincere convictions, actually wise, benevolent, and competent. The observable norm of human experience is that the incompetent fool will show the highest certainty of his own wise competence, the strongest conviction that his answers can be doubted, questioned, even discussed, only by black-hearted, evil-minded villains who seek to oppose his good, wise intentions.

Given that all the rulers are-in-fact wise, benevolent and competent, Communism works just dandy. The Catholic Church has certainly not opposed the *concept* of Communism—they had it centuries ago in various monastic orders. It's just that the Church objects to the actuality —the legalistic mechanisms—of Russian and Chinese style Communism.

Since it can be pretty fairly shown that *any* form of government—from pure anarchy through absolute tyranny, with every possible shading in between—will yield Utopia *provided the rulers are wise, benevolent, and competent,* the place to start engineering our Utopia is with the method of selecting rulers.

I suggest, in fact, that the only constitution Utopia needs is the method of selecting rulers. England has gotten along rather well for quite a period of time without a formal constitution; if they had a better system of selecting their rulers, no need for a constitution would arise. Wise rulers will change traditional methods of governmental operation when, but only when, the change is warranted. We need not bind future centuries with a code that *now* seems optimum; conditions can change rather drastically. Let us set up a method of selecting wise rulers—and then let their wisdom be fully free to operate. If they choose Tyranny—then it can be assumed that Tyranny is, for that time and situation, the optimum governmental system. With a wise tyrant, it is optimum in war, for instance.

The problem is, was, and continues to be—"How to select the rulers?" Plato talked of "philosopher-

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kings". . . but had a little difficulty defining them. The genetic system, based on the unfortunately false proposition "like father, like son" has been tried very widely. Of course, it's heresy to say so in a democracy, but we're members of the Constitutional Convention of the Minor Planetoids, assembled on Ceres, in 2035 A.D., and we can observe that, as a matter of fact, despite the inaccuracy of that father-son idea, the system worked about as well as any other that's been tried. For one thing, it gave England some three hundred years of highly successful government. It's still not good enough—but it's not completely worthless. It must be recognized as having a very real degree of merit. Aristocracy as a system has worked quite well indeed.

Plato's philosopher-king idea runs into the difficulty that, even today, we haven't any battery of tests that can be applied to small children that will, with useful reliability, distinguish the deviant-and-criminal from the deviant-and-genius. Plato's system depended on spotting the youthful philosopher-kings and educating them to the tasks of government; the system won't work, because we can't spot the wise-benevolent.

It gets into further serious difficulty; the way to pass any test is to give the answers the examiner expects. It has nothing whatever to do with giving the *right* answers. Consider a question like "Is the government of the German Third Reich a democracy?" In Germany, in 1941, the answer was, of course, "Ja!" In the rest of the world the answer was different. Incidentally, can anyone give me a standard dictionary definition of "democracy" that does *not*, actually, apply to Hitler's Reich? The *forms* of democracy were there, you know . . . it was just that the rulers operating under those forms were not "wise, benevolent, and competent."

Any formal technique of testing applicants for rulership will have, underlying it, some formal theory of what constitutes "wise, benevolent and competent" . . . which theory rather inevitably turns out to mean "like me."

That's perfectly understandable; the men drawing up the constitution are, of course, playing the role of rulers, temporarily. They feel themselves to be wise, benevolent, and competent . . . or they wouldn't be trying. And, of course, basically everyone feels himself "wise, benevolent, and competent," with the exception of rare moments when, in defense of justice, he has been forced to be malevolent and punish some wrong-doer who unjustly attacked his basic rights. Be it clearly recognized that a homicidal paranoic psychotic, who has just murdered fourteen people, feels deeply that he is wise, benevolent, and competent, and has courageously acted in defense of justice against great odds. They were all persecuting him, and he has simply rebelled against their tyrannies.

Continued on Page 173

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ULTIMA THULE

By MACK REYNOLDS

Illustrated by Schoenherr

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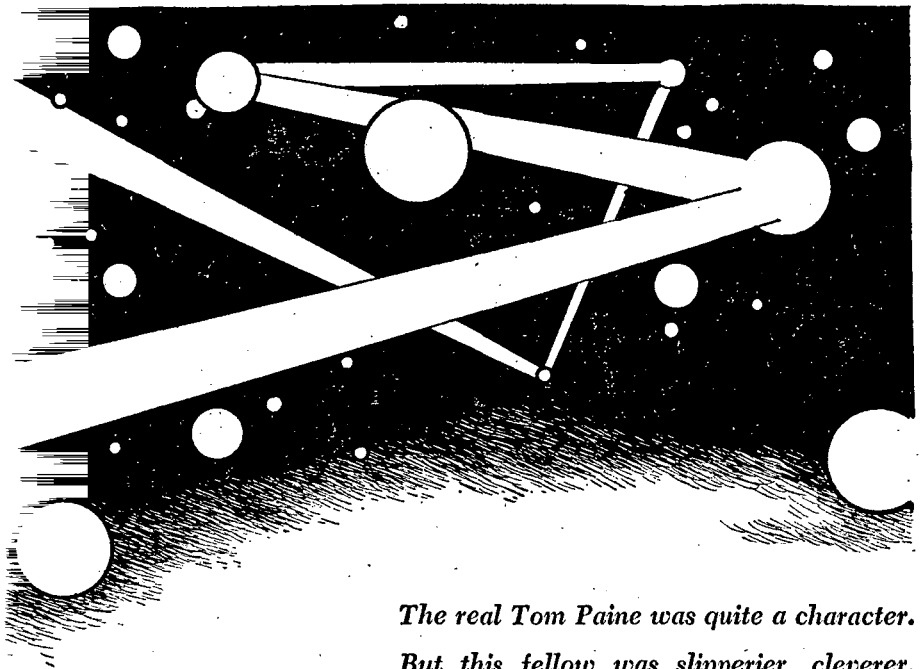
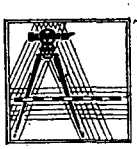


The real Tom Paine was quite a character. But this fellow was slipperier, cleverer, more revolutionary, and hopped about the galaxy like a flea with the hot-foot!



T LEAST he'd got far enough to wind up with a personal interview. It's one thing doing up an application and seeing it go onto an endless tape and be fed into the maw of a machine and then to receive, in a matter of moments, a neatly printed rejection. It's another thing to receive an appointment to be interviewed by a placement officer in the Commissariat of Interplanetary Affairs, Department of Personnel. Ronny Bronston was under no illusions. Nine out of ten men of his age annually made the same application. Almost all were annually rejected. Statistically speaking practically nobody ever got an interplanetary position. But he'd made step one along the path of a lifetime ambition.

He stood at easy attention immediately inside the door. At the desk at

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the far side of the room the placement officer was going through a sheaf of papers. He looked up and said, "Ronald Bronston? Sit down. You'd like an interplanetary assignment, eh? So would I."

Ronny took the chair. For a moment he tried to appear alert, earnest, ambitious but not *too* ambitious, fearless, devoted to the cause, and indispensable. For a moment. Then he gave it up and looked like Ronny Bronston.

The other looked up and took him in. The personnel official saw a man of averages. In the late twenties. Average height, weight and breadth. Pleasant of face in an average sort of way, but not handsome. Less than sharp in dress, hair inclined to be on the undisciplined side. Brown of hair, dark of eye. In a crowd, inconspicuous. In short, Ronny Bronston.

The personnel officer grunted. He pushed a button, said something into his order box. A card slid into the slot and he took it out and stared gloomily at it.

"What're your politics?" he said.

"Politics?" Ronny Bronston said. "I haven't any politics. My father and grandfather before me have been citizens of United Planets. There hasn't been any politics in our family for three generations."

"Family?"

"None."

The other grunted and marked the card. "Racial prejudices?"

"I beg your pardon?"

"Do you have any racial prejudices? Any at all."

"No."

The personnel officer said, "Most people answer that way at first, these days, but some don't at second. For instance, suppose you had to have a blood transfusion. Would you have any objection to it being blood donated by, say, a Negro, a Chinese, or, say, a Jew?"

Ronny ticked it off on his fingers. "One of my greatgrandfathers was a French *colon* who married a Moroccan girl. The Moors are a blend of Berber, Arab, Jew and Negro. Another of my greatgrandfathers was a Hawaiian. They're largely a blend of Polynesians, Japanese, Chinese and Caucasians especially Portuguese. Another of my greatgrandfathers was Irish, English and Scotch. He married a girl who was half Latvian, half Russian." Ronny wound it up. "Believe me, if I had a blood transfusion from just anybody at all, the blood would feel right at home."

The interviewer snorted, even as he marked the card. "That accounts for three greatgrandfathers," he said lightly. "You seem to have made a study of your family tree. What was the other one?"

Ronny said expressionlessly, "A Texan."

The secretary shrugged and looked at the card again. "Religion?"

"Reformed Agnostic," Ronny said. This one was possibly where he ran into a brick wall. Many of the planets had strong religious beliefs of one sort or another. Some of them had state religions and you either belonged or else.

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"Is there any such church?" the personnel officer frowned.

"No. I'm a one-man member. I'm of the opinion that if there are any greater-powers-that-be They're keeping the fact from us. And if that's the way They want it, it's Their business. If and when They want to contact me—one of Their puppets dangling from a string—then I suppose They'll do it. Meanwhile, I'll wait."

The other said interestedly, "You think that if there is a Higher Power and if It ever wants to get in touch with you, It will?"

"Um-m-m. In Its own good time. Sort of a *don't call Me, thing, I'll call you.*"

The personnel officer said, "There have been a few revealed religions, you know."

"So they said, so they said. None of them have made much sense to me. If a Super-Power wanted to contact man, it seems unlikely to me that it'd be all wrapped up in a lot of complicated gobbledegook. It would all be very clear indeed."

The personnel officer sighed. He marked the card, stuck it back into the slot in his order box and it disappeared.

He looked up at Ronny Bronston. "All right, that's all."

Ronny came to his feet. "Well, what happened?"

The other grinned at him sourly. "Darned if I know," he said. "By the time you get to the outer office, you'll probably find out." He scratched the end of his nose and said, "I sometimes wonder what I'm doing here."

Ronny thanked him, told him good-by, and left.

In the outer office a girl looked up from a card she'd just pulled from her own order box. "Ronald Bronston?"

"That's right."

She handed the card to him. "You're to go to the office of Ross Metaxa in the Octagon, Commissariat of Interplanetary Affairs, Department of Justice, Bureau of Investigation, Section G."

In a lifetime spent in first preparing for United Planets employment and then in working for the organization, Ronny Bronston had never been in the Octagon Building. He'd seen photographs, Tri-Di broadcasts and he'd heard several thousand jokes on various levels from pun to obscenity about getting around in the building, but he'd never been there. For that matter, he'd never been in Greater Washington before, other than a long ago tourist trip. Population Statistics, his department, had its main offices in New Copenhagen.

His card was evidently all that he needed for entry.

At the sixth gate he dismissed his car and let it shoot back into the traffic mess. He went up to one of the guard-guides and presented the card.

The guide inspected it. "Section G of the Bureau of Investigation," he muttered. "Every day, something new. I never heard of it."

"It's probably some outfit in charge of cleaning the heads on space lin-

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ers," Ronny said unhappily. He'd never heard of it either.

"Well, it's no problem," the guard-guide said. He summoned a three-wheel, fed the co-ordinates into it from Ronny's card, handed the card back and flipped an easy salute. "You'll soon know."

The scooter slid into the Octagon's hall traffic and proceeded up one corridor, down another, twice taking to ascending ramps. Ronny had read somewhere the total miles of corridors in the Octagon. He hadn't believed the figures at the time. Now he believed them. He must have traversed several miles before they got to the Department of Justice alone. It was another quarter mile to the Bureau of Investigation.

The scooter eventually came to a halt, waited long enough for Ronny to dismount and then hurried back into the traffic.

He entered the office. A neatly uniformed reception girl with a harassed and cynical eye looked up from her desk. "Ronald Bronston?" she said.

"That's right."

"Where've you been?" She had a snappy cuteness. "The commissioner has been awaiting you. Go through that door and to your left."

Ronny went through that door and to the left. There was another door, inconspicuously lettered *Ross Metaxa, Commissioner, Section G.* Ronny knocked and the door opened.

Ross Metaxa was going through a wad of papers. He looked up; a man in the middle years, sour of expression, moist of eye as though he either drank too much or slept too little.

"Sit down," he said. "You're Ronald Bronston, eh? What do they call you, Ronny? It says here you've got a sense of humor. That's one of the first requirements in this lunatic department."

Ronny sat down and tried to form some opinions of the other by his appearance. He was reminded of nothing so much as the stereotype city editor you saw in the historical romance Tri-Ds. All that was needed was for Metaxa to start banging on buttons and yelling something about tearing down the front page, whatever that meant.

Metaxa said, "It also says you have some queer hobbies. Judo, small weapons target shooting, mountain climbing—" He looked up from the reports. "Why does anybody climb mountains?"

Ronny said, "Nobody's ever figured out." That didn't seem to be enough, especially since Ross Metaxa was staring at him, so he added, "Possibly we devotees keep doing it in hopes that someday somebody'll find out."

Ross Metaxa said sourly, "Not *too* much humor, please. You don't act as though getting this position means much to you."

Ronny said slowly, "I figured out some time ago that every young man on Earth yearns for a job that will send him shuttling from one planet to another. To achieve it they study they sweat, they make all out efforts to meet and suck up to anybody they think might help. Finally, when and

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if they get an interview for one of the few openings, they spruce up in their best clothes, put on their best party manners, present themselves as the sincere, high I.Q., ambitious young men that they are—and then flunk their chance. I decided I might as well be what I am."

Ross Metaxa looked at him. "O.K.," he said finally. "We'll give you a try."

Ronny said blankly, "You mean I've got the job?"

"That's right."

"I'll be damned."

"Probably," Metaxa said. He yawned. "Do you know what Section G handles?"

"Well no, but as for me, just so I get off Earth and see some of the galaxy."

Metaxa had been sitting with his heels on his desk. Now he put them down and reached a hand into a drawer to emerge with a brown bottle and two glasses. "Do you drink?" he said.

"Of course."

"Even during working hours?" Metaxa scowled.

"When occasion calls."

"Good," Metaxa said. He poured two drinks. "You'll get your fill of seeing the galaxy," he said. "Not that there's much to see. Man can settle only Earth-type planets and after you've seen a couple of hundred you've seen them all."

Ronny sipped at his drink, then blinked reproachfully down into the glass.

Metaxa said, "Good, eh? A kind of tequila they make on Deneb Eight. Bunch of Mexicans settled there."

"What," said Ronny hoarsely, "do they make it out of?"

"Lord, only knows," Metaxa said. "To get back to Section G. We're Interplanetary Security. In short, Department Cloak and Dagger. Would you be willing to die for the United Planets, Bronston?"

That curve had come too fast. Ronny blinked again. "Only in emergency," he said. "Who'd want to kill me?"

Metaxa poured another drink. "Many of the people you'll be working with," he said.

"Well, *why?* What will I be doing?"

"You'll be representing United Planets," Metaxa explained. "Representing United Planets in cases where the local situation is such that the folks you're working among will be teed off at the organization."

"Well, why are they members if they don't like the UP?"

"That's a good question," Metaxa said. He yawned. "I guess I'll have to go into my speech." He finished his drink. "Now, shut up till I give you some background. You're probably full of a lot of nonsense you picked up in school."

Ronny shut up. He'd expected more of an air of dedication in the Octagon and in such ethereal departments as that of Interplanetary Justice, however, he was in now and not adverse to picking up some sophistication beyond the ken of the Earth-bound employees of UP.

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The other's voice took on a far away, albeit bored tone. "It seems that most of the times man gets a really big idea, he goes off half cocked. Just one example. Remember when the ancient Hellenes exploded into the Mediterranean? A score of different City-States began sending out colonies, which in turn sprouted colonies of their own. Take Syracuse, on Sicily. Hardly was she established than, bingo, she sent off colonists to Southern Italy, and they in turn to Southern France, Corsica, the Balearics. Greeks were exploding all over the place, largely without adequate plans, without rhyme or reason. Take Alexander. Roamed off all the way to India, founding cities and colonies of Greeks all along the way."

The older man shifted in his chair. "You wonder what I'm getting at, eh? Well, much the same thing is happening in man's explosion into space, now that he has the ability to leave the solar system behind. Dashing off half cocked, in all directions, he's flowing out over this section of the galaxy without plan, without rhyme or reason. I take that last back, he has reasons all right—some of the screwiest. Religious reasons, racial reasons, idealistic reasons, political reasons, altruistic reasons and mercenary reasons.

"Inadequate ships, manned by small numbers of inadequate people, setting out to find their own planets, to establish themselves on one of the numberless uninhabited worlds that offer themselves to colonization and exploitation."

Ronny cleared his throat. "Well, isn't that a good thing, sir?"

Ross Metaxa looked at him and grunted. "What difference does it make if it's good or not? It's happening. We're spreading our race out over tens of hundreds of new worlds in the most haphazard fashion. As a result, we of United Planets now have a chaotic mishmash on our hands. How we manage to keep as many planets in the organization as we do, sometimes baffles me. I suppose most of them are afraid to drop out, conscious of the protection UP gives against each other."

He picked up a report. "Here's Monet, originally colonized by a bunch of painters, writers, musicians and such. They had dreams of starting a new race"—Metaxa snorted—"with everybody artists. They were all so impractical that they even managed to crash their ship on landing. For three hundred years they were uncontacted. What did they have in the way of government by that time? A military theocracy, something like the Aztecs of Pre-Conquest Mexico. A matriarchy, at that. And what's their religion based on? That of ancient Phoenicia including plenty of human sacrifice to good old Moloch. What can United Planets do about it, now that they've become a member? Work away very delicately, trying to get them to at least eliminate the child sacrifice phase of their culture. Will they do it? Hell no, not if they can help it. The Head Priestess and her clique are afraid that if they don't have the threat of sacrifice

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to hold over the people, they'll be overthrown."

Ronny was surprised. "I'd never heard of a member planet like that. Monet?"

Metaxa sighed. "No, of course not. You've got a lot to learn, Ronny, my lad. First of all, what're Articles One and Two of the United Planets Charter."

That was easy. Ronny recited. "Article One: *The United Planets organization shall take no steps to interfere with the internal political, socio-economic, or religious institutions of its member planets. Article* Two: *No member planet of United Planets shall interfere with the internal political, socioeconomic or religious institutions of any other member planet.*" He looked at the department head. "But what's that got to do with the fact that I was unfamiliar with even the existence of Monet?"

"Suppose one of the advanced planets, or even Earth itself," Metaxa growled, "openly discussed in magazines, on newscasts, or wherever, the religious system of Monet. A howl would go up among the liberals, the progressives, the do-gooders. And the howl would be heard on the other advanced planets. Eventually, the citizen in the street on Monet would hear about it and be affected. And before you knew it, a howl would go up from Monet's government. Why? Because the other planets would be interfering with her internal affairs, simply by discussing them."

"So what you mean is," Ronny said, "part of our job is to keep information about Monet's government and religion from being discussed at all on other member planets."

"That's right," Metaxa nodded. "And that's just one of our dirty little jobs. One of many. Section G, believe me, gets them all. Which brings us to your first assignment."

Ronny inched forward in his chair. "It takes me into space?"

"It takes you into space all right," Metaxa snorted. "At least it will after a few months of indoctrination. I'm sending you out after a legend, Ronny. You're fresh, possibly you'll get some ideas older men in the game haven't thought of."

"A legend?"

"I'm sending you to look for Tommy Paine. Some members of the department don't think he exists. I do."

"Tommy Paine?"

"A pseudonym that somebody hung on him way back before even my memory in this Section. Did you ever hear of Thomas Paine in American history?"

"He wrote a pamphlet during the Revolutionary War, didn't he?"

"'Common Sense,'" Metaxa nodded. "But he was more than that. He was born in England but went to America as a young man and his writings probably did as much as anything to put over the revolt against the British. But that wasn't enough. When that revolution was successful he went back to England and tried to start one there. The government almost caught him, but he

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escaped and got to France where he participated in the French Revolution."

"He seemed to get around," Ronny Bronston said.

"And so does this namesake of his. We've been trying to catch up with him for some twenty years. How long before that he was active, we have no way of knowing. It was some time before we became aware of the fact that half the revolts, rebellions, revolutions and such that occur in the United Planets have his dirty finger stirring around in them."

"But you said some department members don't believe in his existence."

Metaxa grunted. "They're working on the theory that no one man could do all that Tommy Paine has laid to him. Possibly it's true that he sometimes gets the blame for accomplishments not his. Or, for that matter, possibly he's more than one person. I don't know."

"Well, Ronny said hesitantly, "what's an example of his activity?"

Metaxa picked up another report from the confusion of his desk. "Here's one only a month old. Dictator on the planet Megas. Kidnaped and forced to resign. There's still confusion but it looks as though a new type of government will be formed now."

"But how do they know it wasn't just some dissatisfied citizens of Megas?"

"It seems as though the kidnap vehicle was an old fashioned Earth-type helicopter. There were no such on Megas. So Section G suspects it's a possible Tommy Paine case. We could be wrong, of course. That's why I say the man's in the way of being a legend. Perhaps the others are right and he doesn't even exist. I think he does, and if so, it's our job to get him and put him out of circulation."

Ronny said slowly, "But why would that come under our jurisdiction? It seems to me that it would be up to the police of whatever planet he was on."

Ross Metaxa looked thoughtfully at his brown bottle, shook his head and returned it to its drawer. He looked at a desk watch. "Don't read into the United Planets organization more than there is. It's a fragile institution with practically no independent powers to wield. Every member planet is jealous of its prerogitives, which is understandable. It's no mistake that Articles One and Two are the basic foundation of the Charter. No member planet wants to be interfered with by any other or by United Planets as an organization. They want to be left alone.

"Within our ranks we have planets with every religion known to man throughout the ages. Everything ranging from primitive animism to the most advanced philosophic ethic. We have every political system ever dreamed of, and every socio-economic system. It can all be blamed on the crack-pot manner in which we're colonizing. Any minority, no matter how small—religious, political, racial, or whatever—if it can collect the funds

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to buy or rent a spacecraft, can dash off on its own, find a new Earth-type planet and set up in business.

"Fine. One of the prime jobs of Section G is to carry out, to enforce, Articles One and Two of the Charter. A planet with Buddhism as its state religion, doesn't want some die-hard Baptist missionary stirring up controversy. A planet with a feudalistic socio-economic systems, doesn't want some hot-shot interplanetary businessman coming in with some big deal that would eventually cause the feudalistic nobility to be tossed onto the ash heap. A planet with a dictatorship doesn't want subversives from some democracy trying to undermine their institutions—and vice versa."

"And its our job to enforce all this, eh?" Ronny said.

"That's right," Metaxa told him sourly. "It's not always the nicest job in the system. However, if you believe in United Planets, an organization attempting to co-ordinate in such manner as it can, the efforts of its member planets, for the betterment of all, then you must accept Section G and Interplanetary Security."

Ronny Bronston thought about it.

Metaxa added, "That's why one of the requirements of this job is that you yourself be a citizen of United Planets, rather than of any individual planet, have no religious affiliations, no political beliefs, and no racial prejudices. You've got to be able to stand aloof."

"Yeah," Ronny said thoughtfully.

Ross Metaxa looked at his watch again and sighed wearily. "I'll turn you over to one of my assistants," he said. "I'll see you again, though, before you leave."

"Before I leave?" Ronny said, coming to his feet. "But where do I start looking for this Tommy Paine?"

"How the hell would I know?" Ross Metaxa growled.

In the outer office, Ronny said to the receptionist, "Commissioner Metaxa said for me to get in touch with Sid Jakes."

She said, "I'm Irene Kasansky. Are you with us?"

Ronny said, "I beg your pardon?"

She said impatiently, "Are you going to be with the Section? If you are, I've got to clear you with your old job. You were in statistics over in New Copenhagen, weren't you?"

Somehow it seemed far away now, the job he'd held for more than five years. "Oh, yes," he said. "Yes, Commissioner Metaxa has given me an appointment."

She looked up at him. "Probably to look for Tommy Paine."

He was taken aback. "That's right. How did you know?"

"There was talk. This Section is pretty well integrated." She grimaced, but on her it looked good. "One big happy family. High interdepartmental morale. That sort of jetsam." She flicked some switches. "You'll find Supervisor Jakes through that door, one to your left, two to your right."

He could have asked one *what* to his left and two *what* to his right, but evidently Irene Kasansky thought he

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had enough information to get him to his destination. She'd gone back to her work.

It was one turn to his left and two turns to his right. The door was lettered simply *Sidney Jakes*. He knocked and a voice shouted happily, "It's open. It's always open."

Supervisor Jakes was as informal as his superior. His attire was on the happy-go-lucky side, more suited for sports wear than a fairly high ranking job in the ultra-staid Octagon.

He couldn't have been much older than Ronny Bronston but he had a nervous vitality about him that would have worn out the other in a few hours. He jumped up and shook hands. "You must be Bronston. Call me Sid." He waved a hand at a typed report he's been reading. "Now I've seen them all. They've just applied for entry to United Planets. Republic. What a name, eh?"

"What?" Ronny said.

"Sit down, sit down." He rushed Ronny to a chair, saw him seated, returned to the desk and flicked an order box switch. "Irene," he said, "do up a badge for Ronny, will you? You've got his code, haven't you? Good. Send it over. Bronze, of course."

Sid Jakes turned back to Ronny and grinned at him. He motioned to the report again. "What a name for a planet. Republic. Bunch of screwballs, again. Out in the vicinity of Sirius. Based their system on Plato's *Republic*. Have to go the whole way. Don't even speak Basic. Certainly not. They speak Ancient Greek. That's going to be a neat trick, finding interpreters. How'd you like the Old Man?"

Ronny said, dazed at the conversational barrage, "Old Man? Oh, you mean Commissioner Metaxa."

"Sure, sure," Sid grinned, perching

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himself on the edge of the desk. "Did he give you that drink of tequila during working hours routine? He'd like to poison every new agent we get. What a character."

The grin was infectious. Ronny said carefully, "Well, I did think his method of hiring a new man was a little—cavalier."

"Cavalier, yet," Sid Jakes chortled. "Look, don't get the Old Man wrong. He knows what he's doing. He always knows what he's doing."

"But he took me on after only two or three minutes conversation."

Jakes cocked his head to one side. "Oh? You think so? When did you first apply for interplanetary assignment, Ronny?"

"I don't know, about three years ago."

Jakes nodded. "Well, depend on it, you've been under observation for that length of time. At any one period, Section G is investigating possibly a thousand potential agents. We need men but qualifications are high."

He hopped down from his position, sped around to the other side of the desk and lowered himself into his chair. "Don't get the wrong idea, though. You're not in. You're on probation. Whatever the assignment the Old Man gave you, you've got to carry it out successfully before you're full fledged." He flicked the order-box switch and said, "Irene, where the devil's Ronny's badge?"

Ronny Bronston heard the office girl's voice answer snappishly.

"All right, all right," Jakes said. "I love you, too. Send it in when it comes." He turned to Ronny. "What *is* your assignment?"

"He wants me to go looking for some firebrand nicknamed Tommy Paine. I'm supposed to arrest him. The commissioner said you'd give me details."

Sid Jakes' face went serious. He puckered up his lips. "Wow, that'll be a neat trick to pull off," he said. He flicked the order-box switch again. Irene's voice snapped something before he could say anything and Sid Jakes grinned and said, "O.K., O.K., darling, but if this is the way you're going to be I won't marry you. Then what will the children say? Besides, that's not what I called about. Have ballistics do up a model H gun for Ronny, will you? Be sure it's adjusted to his code."

He flicked off the order box and turned back to Ronny. "I understand you're familiar with hand guns. It's in this report on you."

Ronny nodded. He was just beginning to adjust to this free-wheeling character. "What will I need a gun for?"

Jakes laughed. "Heavens to Betsy, you babe in the woods. Do you realize this Tommy Paine character has supposedly stirred up a couple of score wars, revolutions and revolts? Not to speak of having laid in his lap two or three dozen assassinations. He's a quick lad with a gun. A regular Nihilist."

"Nihilist?"

Jakes chuckled. "When you've been in this Section for a while, you'll be

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familiar with every screwball outfit man has ever dreamed up. The Nihilists were a European group, mostly Russian, back in the Nineteenth Century. They believed that by bumping off a few Grand Dukes and a Czar or so they could force the ruling class to grant reforms. Sometimes they were pretty ingenious. Blew up trains, that sort of thing."

"Look here," Ronny said, "what motivates this Paine fellow? What's he get out of all this trouble he stirs up?"

"Search me. Nobody seems to know. Some think he's a mental case. For one thing, he's not consistent."

"How do you mean?"

"Well, he'll go to one planet and break his back trying to overthrow, say, feudalism. Then, possibly after being successful, he goes to another planet and devotes his energies to establishing the same socio-economic system."

Ronny assimilated that. "You're one of those who believes he exists?"

"Oh, he exists all right, all right," Sid Jakes said happily. "Matter of fact, I almost ran into him a few years ago."

Ronny leaned forward. "I guess I ought to know about it. The more information I have, the better."

"Sure, sure," Jakes said. "This deal of mine was on one of the Aldebaran planets. A bunch of nature boys had settled there."

"Nature boys?"

"Um-m-m. Back to nature. The trouble with the human race is that it's got too far away from nature. So a whole flock of them landed on this planet. They call it Mother, of all things. They landed and set up a primitive society. Absolute stone age. No metals. Lived by the chase and by picking berries, wild fruit, that sort of thing. Not even any agriculture. Wore skins. Bows and arrows were the nearest thing they allowed themselves in the way of mechanical devices."

"Good grief," Ronny said.

"It was a laugh," Jakes told him. "I was assigned there as Section G representative with the UP organization. Picture it. We had to wear skins for clothes. We had to confine ourselves to two or three long houses. Something like the American Iroquois lived in before Columbus. Their society on Mother was based on primitive communism. The clan, the phratry, the tribe. Their religion was mostly a matter of knocking into everybody's head that any progress was taboo. Oh, it was great."

"Well, were they happy?"

"What's happiness? I suppose they were as happy as anybody ever averages. Frankly, I didn't mind the assignment. Lots of fishing, lots of hunting."

Ronny said, "Well, where does Tommy Paine come in?"

"He snuck up on us. Started way back in the boondocks away from any of the larger primitive settlements. Went around putting himself over as a holy man. Cured people of various things from gangrene to eye diseases. Given antibiotics and such, you can imagine how successful he was."

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"Well, what harm did he do?"

"I didn't say he did any harm. But in that manner he made himself awfully popular. Then he'd pull some trick like showing them how to smelt iron, and distribute some corn and wheat seed around and plant the idea of agriculture. The local witch doctors would try to give him a hard time, but the people figured he was a holy man."

"Well, what happened finally?" Ronny wasn't following too well.

"Communications being what they were, before he'd been discovered by the central organization—they had a kind of Council of Tribes which met once a year—he'd planted so many ideas that they couldn't be stopped. The young people'd never go back to flint knives, once introduced to iron. We went looking for friend Tommy Paine, but he got wind of it and took off. We even found where he'd hidden his little space cruiser. Oh, it was Paine, all right, all right."

"But what harm did he do? I don't understand," Ronny scowled.

"He threw the whole shebang on its ear. Last I heard, the planet had broken up into three main camps. They were whaling away at each other like the Assyrians and Egyptians. Iron weapons, chariots, domesticated horses. Agriculture was sweeping the planet. Population was exploding. Men were making slaves out of each other, to put them to work. Oh, it was a mess from the viewpoint of the original nature boys."

A red light flickered on his desk and Sid Jakes opened a delivery drawer and dipped his hand into it. It emerged with a flat wallet. He tossed it to Ronny Bronston.

"Here you are. Your badge."

Ronny opened the wallet and examined it. He'd never seen one before, but for that matter he'd never heard of Section G before that morning. It was a simple enough bronze badge. It said on it, merely, *Ronald Bronston, Section G, Bureau of Investigation, United Planets.*

Sid Jakes explained. "You'll get cooperation with that through the Justice Department anywhere you go. We'll brief you further on procedure during indoctrination. You in turn, of course, are to co-operate with any other agent of Section G. You're under orders of anyone with"—his hand snaked into a pocket and emerged with a wallet similar to Ronny's—"a silver badge, carried by a First Grade Agent, or a gold one of Supervisor rank."

Ronny noted that his badge wasn't really bronze. It had a certain sheen, a brightness.

Jakes said, "Here, look at this." He tossed his own badge to the new man. Ronny looked down at it in surprise. The gold had gone dull.

Jakes laughed. "Now give me yours."

Ronny got up and walked over to him and handed it over. As soon as the other man's hand touched it, the bronze lost its sheen.

Jakes handed it back. "See, it's tuned to you alone," he said. "And mine is tuned to my code. Nobody can swipe a Section G badge and

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impersonate an agent. If anybody ever shows you a badge that doesn't have its sheen, you know he's a fake. Neat trick, eh?"

"Very neat," Ronny admitted. He returned the other's gold badge. "Look, to get back to this Tommy Paine."

But the red light flickered again and Jakes brought forth from the delivery drawer a hand gun complete with shoulder harness. "Nasty weapon," he said. "But we'd better go on down to the armory and show you its workings."

He stood up. "Oh, yes, don't let me forget to give you a communicator. A real gizmo. About as big as a woman's vanity case. Puts you in immediate contact with the nearest Section G office, no matter how near or far away it is. Or, if you wish, in contact with our offices here in the Octagon. Very neat trick."

He led Ronny Jakes from his office and down the corridors beyond to an elevator. He said happily, "This is a crazy outfit, this Section G. You'll probably love it. Everybody does."

Ronny learned to love Section G —in moderation.

He was initially taken aback by the existence of the organization at all. He'd known, of course, of the Department of Justice and even of the Bureau of Investigation, but Section G was hush-hush and not even United Planets publications ever mentioned it.

The problems involved in remaining hush-hush weren't as great as all that. The very magnitude of the UP which involved more than two thousand member planets, allowed of departments and bureaus hidden away in the endless stretches of red tape.

In fact, although Ronny Bronston had spent the better part of his life, thus far, in studying for a place in the organization, and then working in the Population Statistics Department for some years, he was only now beginning to get the over-all picture of the workings of the mushrooming, chaotic United Planets organization.

It was Earth's largest industry by far. In fact, for all practical purposes it was her only major industry. Tourism, yes, but even that, in a way, was related to the United Planets organization. Millions of visitors whose ancestors had once emigrated from the mother planet, streamed back in racial nostalgia. Streamed back to see the continents and oceans, the Arctic and the Antarctic, the Amazon River and Mount Everest, the Sahara and New York City, the ruins of Rome and Athens, the Vatican, the Louvre and the Hermitage.

But the populace of Earth, in its hundreds of millions were largely citizens of United Planets and worked in the organization and with its auxiliaries such as the Space Forces.

Section G? To his surprise, Ronny found that Ross Metaxa's small section of the Bureau of Investigation seemed almost as great a secret within the Bureau as it was to the man in the street. At one period, Ronny wondered if it were possible that this was a department which had been

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lost in the wilderness of boondoggling that goes on in any great bureaucracy. Had Section G been set up a century or so ago and then forgotten by those who had originally thought there was a need for it? In the same way that it is usually more difficult to get a statute off the lawbooks than it was originally to pass it, in the same manner eliminating an office, with its employees can prove more difficult than originally establishing it.

But that wasn't it. In spite of the informality, the unconventional brashness of its personnel on all levels, and the seeming chaos in which its task were done, Section G was no make-work project set up to provide juicy jobs for the relatives of high ranking officials. To the contrary, it didn't take long in the Section before anybody with open eyes could see that Ross Metaxa was privy to the decisions made by the upper echelons of UP.

Ronny Bronston came to the conclusion that the appointment he'd received was putting him in a higher bracket of the UP hierarchy than he'd at first imagined.

His indoctrination course was a strain such as he'd never known in school years. Ross Metaxa was evidently of the opinion that a man could assimilate concentrated information at a rate several times faster than any professional educator ever dreamed possible. No threats were made, but Ronny realized that he could be dropped even more quickly than he'd seemed to have been taken on. There were no classes, to either push or retard the rate of study. He worked with a series of tutors, and pushed himself. The tutors were almost invariably Section G agents, temporarily in Greater Washington between assignments, or for briefing on this phase or that of their work.

Even as he studied, Ronny Bronston kept the eventual assignment at which he was to prove himself, in mind. He made a point of inquiring of each agent he met, about Tommy Paine.

The name was known to all, but no two reacted in the same manner. Several of them even brushed the whole matter aside as pure legend. *Nobody* could accomplish all the trouble that Tommy Paine had supposedly stirred up.

To one of these, Ronny said plaintively, "See here, the Old Man believes in him, Sid Jakes believes in him. My final appointment depends on arresting him. How can I ever secure this job, if I'm chasing a myth?"

The other shrugged. "Don't ask me. I've got my own problems. O.K., now, let's run over this quesion of Napoleonic law. There are at least two hundred planets that base their legal system on it."

But the majority of his fellow employees in Section G had strong enough opinions on the interplanetary firebrand. Three or four even claimed to have seen him fleetingly, although no two descriptions jibed. That, of course, could be explained. The man could resort to plastic surgery and other disguise.

Theories there were in plenty,

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some of them going back long years, and some of them pure fable.

"Look," Ronny said in disgust one day after a particularly unbelievable siege with two agents recently returned from a trouble spot in a planetary system that involved three aggressive worlds which revolved about the same sun. "Look, it's impossible for one man to accomplish all this. He's blamed for half the *coups d'états,* revolts and upheavals that have taken place for the past quarter century. It's obvious nonsense. Why, a revolutionist usually spends the greater part of his life toppling a government. Then, once it's toppled, he spends the rest of his life trying to set up a new government—and he's usually unsuccessful."

One of the others was shaking his head negatively. "You don't understand this Tommy Paine's system, Bronston."

"You sure don't," the other agent, a Nigerian, grinned widely. "I've been on planets where he'd operated."

Ronny leaned forward. The three of them were having a beer in a part of the city once called Baltimore. "You have?" he said. "Tell me about it, eh? The more background I get on this guy, the better."

"Sure. And this'll give you an idea of how he operates, how he can get so much trouble done. Well, I was on this planet Goshen, understand? It had kind of a strange history. A bunch of colonists went out there, oh, four or five centuries ago. Pretty healthy expedition, as such outfits go. Bright young people, lots of equipment, lots of know-how and books. Well, through sheer bad luck everything went wrong from the beginning. Everything. Before they got set up at all they had an explosion that killed off all their communications technicians. They lost contact with the outside. O.K. Within a couple of centuries they'd gotten into a state of chatel slavery. Pretty well organized, but static. Kind of an Athenian Democracy on top, a hierarchy, but nineteen people out of twenty were slaves, and I mean *real* slaves, like animals. They were at this stage when a scout ship from the UP Space Forces discovered them and, of course, they joined up."

"Where does Tommy Paine come in?" Ronny said. He signaled to a waiter for more beer.

"He comes in a few years later. I was the Section G agent on Goshen, understand? No planet was keener about Articles One and Two of the UP Charter. The hierarchy understood well enough that if their people ever came to know about more advanced socio-economic systems it'd be the end of Goshen's Golden Age. So they allowed practically no intercourse. No contact whatsoever between UP personnel and anyone outside the upper class, understand? All right. That's where Tommy Paine came in. It couldn't have taken him more than a couple of months at most."

Ronny Bronston was fascinated. "What'd he do?"

"He introduced the steam engine, and then left."

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Ronny was looking at him blankly. "Steam engine?"

"That and the fly shuttle and the spinning jenny," the Nigerian said. "That Goshen hierarchy never knew what hit them."

Ronny was still blank. The waiter came up with the steins of beer, and Ronny took one and drained half of it without taking his eyes from the storyteller.

The other agent took it up. "Don't you see? Their system was based on chattel slavery, hand labor. Given machinery and it collapses. Chattel slavery isn't practical in a mechanized society. Too expensive a labor force, for one thing. Besides, you need an educated man and one with some initiative—qualities that few slaves possess—to run an industrial society."

Ronny finished his beer. "Smart cooky, isn't he?"

"He's smart all right. But I've got a still better example of his fouling up a whole planetary socio-economic system in a matter of weeks. A friend of mine was working on a planet with a highly-developed feudalism. Barons, lords, dukes, counts and no-accounts. all stashed safely away in castles and fortresses up on the top of hills. The serfs down below did all the work in the fields, provided servants, artisans and foot soldiers for the continual fighting that the aristocracy carried on. Very similar to Europe back in the Dark Ages."

"So?" Ronny said. "I'd think that'd be a deal that would take centuries to change."

The Section G agent laughed. "Tommy Paine stayed just long enough to introduce gunpowder. That was the end of those impregnable castles up on the hills."

"What gets me," Ronny said slowly, "is his motivation."

The other two both grunted agreement to that.

Toward the end of his indoctrination studies, Ronny appeared one morning at the Octagon Section G offices and before Irene Kasansky. Watching her fingers fly, listening to her voice rapping and snapping, O.K.-ing and rejecting, he came to the conclusion that automation could go just so far in office work and then you were thrown back on the hands of the efficient secretary. Irene was a one-woman office staff.

She looked up at him. "Hello, Ronny. Thought you'd be off on your assignment by now. Got any clues on Tommy Paine?"

"No," he said. "That's why I'm here. I wanted to see the commissioner."

"About what?" She flicked a switch. When a light flickered on one of her order boxes, she said into it, "No," emphatically, and turned back to him.

"He said he wanted to see me again before I took off."

She fiddled some more, finally said, "All right, Ronny. Tell him he's got time for five minutes with you."

"Five minutes!"

"Then he's got an appointment with the Commissioner of Interplane-

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tary Culture," she said. "You'd better hurry along."

Ronny Bronston retraced the route of his first visit here. How long ago? It already seemed ages since his probationary appointment. Your life changed fast when you were in Section G.

Ross Metaxa's brown bottle, or its twin, was sitting on his desk and he was staring at it glumly. He looked up and scowled.

"Ronald Bronston," Ronny said. "Irene Kasansky told me to say I could have five minutes with you, then you have an appointment with the Commissioner of Interplanetary Culture."

"I remember you," Metaxa said. "Have a drink. Interplanetary Culture, ha! The Xanadu Folk Dance Troupe. They dance nude. They've been touring the whole UP. Roaring success everywhere, obviously. Now they're assigned to Virtue, a planet settled by a bunch of Fundamentalists. They want the troupe to wear Mother Hubbards. The Xanadu outfit is in a tizzy. They've been insulted. They claim they're the most modest members of UP, that nudity has nothing to do with modesty. The government of Virtue says that's fine but they wear Mother Hubbards or they don't dance. Xananu says it'll withdraw from United Planets."

Ronny Bronston said painfully, "Why not let them?"

Ross Metaxa poured himself a Denebian tequila, offered his subordinate a drink again with a motion of the bottle. Ronny shook his head.

Metaxa said, "If we didn't take steps to soothe these things over, there wouldn't be any United Planets. In any given century every member in the organization threatens to resign at least once. Even Earth. And then what'd happen? You'd have interplanetary war before you knew it. What'd you want, Ronny?"

"I'm about set to take up my search for this Tommy Paine."

"Ah, yes, Tommy Paine. If you catch him, there are a dozen planets where he'd be eligible for the death sentence."

Ronny cleared his throat. "There must be. What I wanted was the file on him, sir."

"File?"

"Yes, sir. I've got to the point where I want to cram up on everything we have on him. So far, all I've got is verbal information from individual agents and from Supervisor Jakes."

"Don't be silly, Ronny. There isn't any file on Tommy Paine."

Ronny just looked at the other.

Ross Metaxa said impatiently, "The very knowledge of the existence of the man is top secret. Isn't that obvious? Suppose some reporter got the story and printed it. If our member planets knew there was such a man and that we haven't been able to scotch him, why they'd drop out of UP so fast the computers couldn't keep up with it. There's not one planet in ten that feels secure enough to lay itself open to subversion. Why some of our planets are so far down the ladder of social evolution they live un-

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der primitive tribal society; their leaders, their wise men and witch-doctors, whatever you call them, are scared someone will come along and establish chattel slavery. Those planets that have a system based on slavery are scared to death of developing feudalism, and those that have feudalism are afraid of *creeping capitalism.* Those with an anarchistic basis—and we have several—are afraid of being subverted to statism, and those who have a highly developed government are afraid of anarchism. The socio-economic systems based on private ownership of property hate the very idea of socialism or communism, and vice versa, and those planets with state capitalism hate them both."

He glared at Ronny. "What do you think the purpose of this Section is, Bronston? Our job is to keep our member planets from being afraid of each other. If they found that Tommy Paine and his group, if he's got a group, were buzzing through the system subverting everything they can foul up, they'd drop out of UP and set up quarantines that a space mite couldn't get through. No sir, there is no file on Tommy Paine and there never will be. And if any news of him spreads to the outside, this Section will emphatically deny he exists. I hope that's clear."

"Well, yes sir," Ronny said. The commissioner had been all but roaring toward the end.

The order box clicked on Ross Metaxa's desk and he said loudly, "What?"

"Don't yell at me," Irene snapped

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back. "Ronny's five minutes are up. You've got an appointment. I'm getting tired of this job. It's a madhouse. I'm going to quit and get a job with Interplanetary Finance."

"Oh, yeah," Ross snarled back. "That's what you think. I've taken measures. Top security. I've warned off every Commissioner in UP. You can't get away from me until you reach retirement age. Although I don't know why I care. I hate nasty tempered women."

"Huh!" she snorted and clicked off.

"There's a woman for you," Ross Metaxa growled at Ronny. "It's too bad she's indispensable. I'd love to fire her. Look, you go in and see Sid Jakes. Seems to me he said something about Tommy Paine this morning. Maybe it's a lead." He came to his feet. "So long and good luck, Ronny. I feel optimistic about you. I think you'll get this Paine troublemaker."

Which was more than Ronny Bronston thought.

Sid Jakes already had a visitor in his office, which didn't prevent him from yelling, "It's open," when Ronny Bronston knocked.

He bounced from his chair, came around the desk and shook hands enthusiastically. "Ronny!" he said, his tone implying they were favorite brothers for long years parted. "You're just in time."

Ronny took in the office's other occupant appreciatively. She was a small girl, almost tiny. He estimated her to be at least half Chinese, or maybe Indo-Chinese, the rest probably European or North American. She evidently favored her Asiatic blood, her dress was traditional Chinese, slit almost to the thigh Shanghai style.

Sid Jakes said, "Tog Lee Chang Chu—Ronny Bronston. You'll be working together. Bloodhounding old Tommy Paine. A neat trick if you can pull it off. Well, are you all set to go?"

Ronny mumbled something to the girl in the way of amenity, then looked back at the supervisor. "Working together?" he said.

"That's right. Lucky you, eh?"

Tog Lee Chang Chu said demurely, "Possibly Mr. Bronston objects to having a female assistant."

Sid Jakes snorted, and hurried around his desk to resume his seat. "Does he look crazy? Who'd object to having a cutey like you around day in and day out? Call him Ronny. Might as well get used to it. Two of you'll be closer than man and wife."

"Assistant?" Ronny said, bewildered. "What do I need an assistant for?" He turned his eyes to the girl. "No reflection on you, Miss . . . ah, Tog."

Sid Jakes laughed easily. "Section G operatives always work in pairs, Ronny. Especially new agents. The advantages will come home to you as you go along. Look on Tog Lee Chang Chu as a secretary, a man Friday. This isn't her first assignment, of course. You'll find her invaluable."

The supervisor plucked a card from an order box. "Now here's the dope. Can you leave within four hours? There's a UP Space Forces cruiser

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going to Merlini, they can drop you off at New Delos. Fastest way you could possibly get there. The cruiser takes off from Neuve Albuquerque in, let's see, three hours and forty-five minues."

"New Delos?" Ronny said, taking his eyes from the girl and trying to catch up with the grasshopper-like conversation of his superior.

"New Delos it is," Jakes said happily. "With luck, you might catch him before he can get off the planet." He chuckled at the other's expression. "Look alive, Ronny! The quarry is flushed and on the run. Tommy Paine's just assassinated the Immortal God-King of New Delos. A neat trick, eh?"

The following hours were chaotic. There was no indication of how long a period he'd be gone. For all he knew, it might be years. For that matter, he might never return to Earth. This Ronny Bronston had realized before he ever applied for an interplanetary appointment. Mankind was exploding through this spiral arm of the galaxy. There was a racial enthusiasm about it all. Man's destiny lay out in the stars, only a laggard stayed home of his own accord. It was the ambition of every youth to join the snowballing avalanche of man into the neighboring stars.

It took absolute severity by Earth authorities to prevent the depopulation of the planet. But someone had to stay to administer the ever more complicated racial destiny. Earth became a clearing house for a thousand cultures, attempting, with only moderate success, to co-ordinate her widely spreading children. She couldn't afford to let her best seed depart. Few there were, any more, allowed to emigrate from Earth. New colonies drew their immigrants from older ones.

Lucky was the Earthling able to find service in interplanetary affairs, in any of the thousands of tasks that involved journey between member planets of UP. Possibly one hundredth of the population at one time or another, and for varying lengths of time, managed it.

Ronny Bronston was lucky and knew it. The thing now was to pull off this assignment and cinch the appointment for good.

He packed in a swirl of confusion. He phoned a relative who lived in the part of town once known as Richmond, explained the situation and asked that the other store his things and dispose of the apartment he'd been occupying.

Luckily, the roof of his apartment building was a copter-cab pickup point and he was able to hustle over to the shuttleport in a matter of a few minutes.

He banged into the reservations office, hurried up to one of the windows and said into the screen, "I've got to get to Neuve Albuquerque immediately."

The expressionless voice said, "The next rocket leaves at sixteen hours."

"Sixteen hours! I've got to be at the spaceport by that time!"

The voice said dispassionately, "We are sorry."

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The bottom fell out of everything. Ronny said, desperately, "Look, if I miss my ship in Neuve Albuquerque, what is the next spaceliner leaving from there for New Delos?"

"A moment, citizen." There was an agonized wait, and then the voice said, "There is a liner leaving for New Delos on the 14th of next month. It arrives in New Delos on the 31st, Basic Earth calendar."

The 31st! Tommy Paine could be halfway across the galaxy by that time.

A gentle voice next to him said, "Could I help, Ronny?"

He looked around at her. "Evidently, nobody can," he said disgustedly. "There's no way of getting to Neuve Albuquerque in time to get that cruiser to New Delos."

Tog Lee Chang Chu fished in her bag and came up with a wallet similar to the one in which Ronny carried his Section G badge. She held it up to the screen. "Bureau of Investigation, Section G," she said calmly. "It will be necessary that Agent Bronston and myself be in Neuve Albuquerque within the hour."

The metallic voice said, "Of course. Proceed to your right and through Corridor K to Exit Four. Your rocket will be there. Identify yourself to Lieutenant Economou who will be at the desk at Exit Four."

Tog turned to Ronny Bronston. "Shall we go?" she said demurely.

He cleared his throat, feeling foolish. "Thanks, Tog," he said.

"Not at all, Ronny. Why, this is my job."

Was there the faintest of sarcasm in her voice? It hadn't been more than a couple of hours ago that he had been hinting rather heavily to Sid Jakes that he needed no assistance.

She even knew the layout of the West Greater Washington shuttleport. Her small body swiveled through the hurrying passengers, her small feet a-twinkle, as she led him to and down Corridor K and then to the desk at Exit Four.

Ronny anticipated her here. He flashed his own badge at the chairborne Space Forces lieutenant there.

"Lieutenant Economou?" he said. "Ronald Bronston, of the Bureau of Investigation, Section G. We've got to get to Neuve Albuquerque soonest."

The lieutenant, only mildly impressed, said, "We can have you in the air in ten minutes, citizen. Just a moment and I'll guide you myself."

In the rocket, Ronny had time to appraise her at greater length. She was a delicately pretty thing, although her expression was inclined to the over-serious. There was only a touch of the Mongolian fold at the corner of her eyes. On her it looked unusually good. Her complexion was that which only the blend of Chinese and Caucasian can give. Her figure, thanks to her European blood, was fuller than Eastern Asia usually boasts; tiny, but full.

Let's admit it, he decided. My assistant is the cutest trick this side of a Tri-Di movie queen, and we're going

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to be thrown in the closest of juxtaposition for an indefinite time. This comes under the head of work?

He said, "Look here, Tog, you were with Sid Jakes longer than I was. What's the full story?"

She folded her slim hands in her lap, looking like a schoolgirl about to recite. "Do you know anything about the socio-economic system on New Delos?"

"Well, no," he admitted.

She said severely, "I'd think that they would have given you more background before an assignment of this type."

Ronny said impatiently, "In the past three months I've been filled in on the economic systems, the religious beliefs, the political forms, of a thousand planets. I just happened to miss New Delos."

Her mouth expressed disapproval by tucking down on the sides, which was all very attractive but also irritating. She said, "There are two thousand, four hundred and thirty-six member planets in the UP, I'd think an agent of Section G would be up on the basic situation on each."

He had her there. He said snidely, "Hate to contradict you, Tog, but the number is two thousand, four hundred and thirty-four."

"Then," she nodded agreeably, "membership has changed since this morning when Menalaus and Aldeberan Three were admitted. Have two planets dropped out?"

"Look," he said, "let's stop bickering. What's the word on New Delos?"

"Did you ever read Frazer's 'Golden Bough'?" she said.

"No."

"You should. At any rate, New Delos is a theocracy. A priesthood elite rules it. A God-King, who is immortal, holds absolute authority. The strongest of superstition plus an efficient inquisition, keeps the people under control."

"Sounds terrible," Ronny growled.

"Why? Possibly the government is extremely efficient and under it the planet progressing at a rate in advance of UP averages."

He stared at her in surprise.

She said, "Would you rather be ruled by the personal, arbitrary whims of supremely wise men, or by laws formulated by a mob?"

It stopped him momentarily. In all his adult years, he couldn't remember ever meeting an intelligent, educated person who had been opposed to the democratic theory.

"Wait a minute, now," he said. "Who decides that they're supremely wise men who are doing this arbitrary ruling? Let any group come to power, by whatever means, and they'll soon tell you they're an elite. But let's get back to New Delos, from what you've said so far, the people are held in a condition of slavery."

"What's wrong with slavery?" Tog said mildly.

He all but glared at her. "Are you kidding?"

"I seldom jest," Tog said primly. "Under the proper conditions, slavery can be the most suitable system for a people."

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"Under *what* conditions!"

"Have you forgotten your Earth history to the point where Egypt, Greece and Rome mean nothing to you? Man made some of his outstanding progress under slavery. And do you contend that man's lot is necessarily miserable given slavery? As far back as Aesop we know of slaves who have reached the heights in their society. Slaves sometimes could and did become the virtual rulers in ancient countries." She shrugged prettily. "The prejudices which you hold today, on Earth, do not necessarily apply to all time, nor to all places."

He said, impatiently, "Look, Tog, we can go into this further, later. Let's get back to New Delos. What happened?"

Tog said, "The very foundation of their theocracy is the belief on the part of the populace that the God-King is immortal. No man conspires against his Diety. Supervisor Jakes informed me that it is understood by UP Intelligence, that about once every twenty years the priesthood secretly puts in a new God-King. Plastic surgery would guarantee facial resemblance, and, of course, the rank and file citizen would probably never be allowed close enough to discover that their God-king seemed different every couple of decades. At any rate, it's been working for some time."

"And there's been no revolt against this religious aristocracy?"

She shook her head. "Evidently not. It takes a brave man to revolt against both his king and his God at the same time."

"But what happened now?" Ronny pursued.

"Evidently, right in the midst of a particularly important religious ceremony, with practically the whole planet watching on TV, the God-King was killed with a bomb. No doubt about it, definitely killed. There are going to be a lot of people on New Delos wondering how it can be that an immortal God-King can die."

"And Sid thinks it's Tommy Paine's work?"

She shifted dainty shoulders in a shrug. "It's the sort of thing he does. I suppose we'll learn when we get there."

Even on the fast Space Forces cruiser, the trip was going to take a week, and there was precious little Ronny Bronston could do until arrival. He spent most of his time reading up on New Delos and the several other planets in the UP organization which had fairly similar regimes. More than a few theocracies had come and gone during the history of man's development into the stars.

He also spent considerable time playing Battle Chess or talking with Tog and with the ship's officers.

These latter were a dedicated group, high in morale, enthusiastic about their work which evidently involved the combined duties of a Navy, a Coast Guard, and a Coast and Geodetic Survey system, if we use the ocean going services of an earlier age for analogy.

They all had the dream. The enthusiasm of men participating in a

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race's expansion to glory. There was the feeling, even stronger here in space than back on Earth, of man's destiny being fulfilled, that humanity had finally emerged from its infancy, that the fledging had finally found its wings and got off the ground.

After one of his studying binges, Ronny Bronston had spent an hour or so once with the captain of the craft, while that officer stood an easy watch on the ship's bridge. There was little enough to do in space, practically nothing, but there was always an officer on watch.

They leaned back in the acceleration chairs before the ship's controls and Ronny listened to the other's space lore. Stories of far planets, as yet untouched. Stories of planets that had seemingly been suitable for colonization, but had proved disastrous for man, for this reason or that.

Ronny said, "And never in all this time have we run into a life form that has proved intelligent?"

Captain Woiski said, "No. Not that I know of. There was an animal on Shangri-La of about the mental level of the chimpanzee. So far as I know, that's the nearest to it."

"Shangri-La?" Ronny said. "That's a new one."

There was an affectionate gleam in the captain's eye. "Yes," he said. "If and when I retire, I think that'd be the planet of my choice, if I could get permission to leave Earth, of course."

Ronny scowled in attempted memory. "Now that you mention it, I think I did see it listed the other day among planets with a theocratic government."

The captain grunted protest. "If you're comparing it to this New Delos you're going to, you're wrong. There can be theocracy and theocracy, I suppose. Actually, I imagine Shangri-La has the most, well *gentle* government in the system."

Ronny was interested. His recent studies hadn't led him to much respect for a priesthood in political power. "What's the particular feature that's seemed to have gained your regard?"

"Moderation," Woiski chuckled. "They carry it almost to the point of immoderation. But not quite. Briefly, it works something like this. They have a limited number of monks—I suppose you'd call them—who spend their time at whatever moves them. At the arts, at scientific research, at religious contemplation—any religion will do—as students of anything and everything, and at the governing of Shangri-La. They make a point of enjoying the luxuries in moderation and aren't a severe drain on the rank and file citizens of the planet."

Ronny said, "I have a growing distrust of hierarchies. Who decides who is to become a monk and who remain a member of the rank and file?"

The captain said, "A series of the best tests they can devise to determine a person's intelligence and aptitudes. From earliest youth, the whole populace is checked and rechecked. At the age of thirty, when it is considered that a person has become

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adult and has finished his basic education, a limited number are offered monkhood. Not all want it."

Ronny thought about it. "Why not? What are the shortcomings?"

The captain shrugged. "Responsibility, I suppose."

"The monks aren't allowed sex, booze, that sort of thing, I imagine."

"Good heavens, why not? In moderation, of course."

"And they live on a higher scale?"

"No, no, not at all. Don't misunderstand. The planet is a prosperous one. Exceedingly prosperous. There is everything needed for comfortable existence for everyone. Shangri-La is one planet where the pursuit of happiness is pursuable by all." Captain Woiski chuckled again.

Ronny said, "It sounds good enough, although I'm leary of benevolent dictatorships. The trouble with them is that it's up to the dictators to decide what's benevolent. And almost always, nepotism rears its head, favoritism of one sort or another. How long will it be before one of your moderate monks decides he'll moderately tinker with the tests, or whatever, just to be sure his favorite nephew makes the grade? A high I.Q. is no guarantee of integrity."

The captain didn't disagree. "That's always possible, I suppose. One guard against it, in this case, is the matter of motive. The *privilege* of being a monk isn't as great as all that. Materially, you aren't particularly better off than any one else. You have more leisure, that's true, but actually most of them are so caught up in their studies or research that they put in more hours of endeavor than does the farmer or industrial worker on Shangri-La."

"Well," Ronny said, "let's just hope that Tommy Paine never hears of this place?"

"Who?" the captain said.

Ronny Bronston reversed his engines. "Oh, nobody important. A guy I know of."

Captain Woiski scowled. "Seems to me I've heard the name."

At first Ronny leaned forward with quick interest. Perhaps the cruiser's skipper had a lead. But, no, he sank back into his chair. That name was strictly a Section G pseudonym. No one used it outside the department, and he'd already said too much by using the term at all.

Ronny said idly, "Probably two different people. I think I'll go on back and see how Tog is doing."

Tog was at her communicator when he entered the tiny ship's lounge. Ronny could see in the brilliant little screen of the compact device, the grinning face of Sid Jakes. Tog looked up at Ronny and smiled, then clicked the device off.

"What's new?" Ronny said.

She moved graceful shoulders. "I just called Supervisor Jakes. Evidently there's complete confusion on New Delos. Mobs are storming the temples. In the capital the priests tried to present a new God-King and he was laughed out of town."

Ronny snorted cynically. "Sounds good to me. The more I read about New Delos and its God-King and his

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priesthood, the more I think the best thing that ever happened to the planet was this showing them up."

Tog looked at him, the sides of her mouth tucking down as usual when she was going to contradict something he said. "It sounds bad to me," she said. "Tommy Paine's work is done. He'll be off to some other place and we won't get there in time to snare him."

Ronny considered that. It was probably true. "I wonder," he said slowly, "if it's possible for us to get a list of all ships that have blasted off since the assassination, all ships and their destination from New Delos."

The idea grew in him. "Look! It's possible that a dictatorial government such as theirs would immediately quarantine every spaceport on the planet."

Tog said, "There's only one spaceport on New Delos. The priesthood didn't encourage trade or even communication with the outside. Didn't want its people contaminated."

"Holy smokes!" Ronny blurted. "It's possible that Tommy Paine's on that planet and can't get off. Look, Tog, see if you can raise the Section G representative on New Delos and—"

Tog said demurely, "I already have taken that step, Ronny, knowing that you'd want me to. Agent Mouley Hassan has promised to get the name and destination of every passenger that leaves New Delos."

Ronny sat down at a table and dialed himself a mug of stout. "Drink?" he said to Tog. "Possibly we've got something to celebrate."

She shook her head disapprovingly. "I don't use depressants."

There was nothing more to be discussed about New Delos, they simply would have to wait until their arrival. Ronny switched subjects. "Ever hear of the planet Shangri-La?" he asked her. He took a sip of his brew.

"Of course," she said. "A rather small planet, Earth type within four degrees. Noted for its near perfect climate and its scenic beauty."

"Captain was talking about it," Ronny said. "Sounds like a regular paradise."

Tog made a negative sound.

"Well, what's wrong with Shangri-La?" Ronny said impatiently.

"Static," she said briefly.

He looked at her. "It sounds to me as though it's developed a near perfect socio-economic system. What do you mean, static?"

"No push, no drive," Tog said definitely. "Everyone—what is the old term?—everyone has it made. The place is stagnating. I wouldn't be surprised to see Tommy Paine show up there sooner or later."

Ronny said, "Look, since we've known each other, have I ever said anything you agree with?"

Tog raised her delicate eyebrows. "Why, Ronny. You know perfectly well we both agreed that the eggs for breakfast were quite inedible."

Ronny came to his feet again. Considering her size, she certainly was an irritating baggage. "I think I'll go to my room and see if I can get any inspirations on tracking down our quarry."

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"Good night, Ronny," she said demurely.

They ran into a minor difficulty upon arrival at New Delos. The captain called both Ronny Bronston and Tog Lee Chang Chu to the bridge.

He nodded in the direction of the communications screen. A bald headed, robed character—obviously a priest—scowled at them.

Captain Woiski said, "The Sub-Bishop informs me that the provisional government has ruled that any spacecraft landing on New Delos cannot take off again without permission and that every individual who lands, even United Planets personnel, will need an exit visa before being allowed to depart."

Ronny said, "Then you can't land?"

The captain said reasonably, "My destination is Merlini. I've gone out of my way slightly to drop you off here. But I can't afford to take the chance of having my ship tied up for what might be an indefinite period. Evidently, there's considerably civil disorder down there."

From the screen the priest snapped, "That is an inaccurate manner of describing the situation."

"Sorry," the captain said dryly.

Ronny Bronston said desperately, "But, captain, Miss Tog and I simply have to land." He reached for his badge. "High priority, Bureau of Investigation."

The captain shrugged his hefty shoulders. "Sorry, I have no instructions that allow me to risk tying up my ship. Here's a possibility. Can you pilot a landing craft? I could spare you one, then you and your assistant would be the only ones involved. You could turn it over to whatever Space Forces base we have here."

Ronny said miserably, "No. I'm not a space pilot."

"I am," Tog said softly. "The idea sounds excellent."

"We shall expect you," the Sub-Bishop said. The screen went blank.

Tog Lee Chang Chu piloted a landing craft with the same verve that she seemed to be able to handle any other responsibility. As he sat in the seat next to her, Ronny Bronston took in her practiced flicking of the controls from the side of his eyes. He wondered vaguely at the efficiency of such Section G officials as Metaxa and Jakes that they would assign an unknown quality such as himself to a task as important as running down Tommy Paine, and then as an assistant provide him with an experienced operative such as Tog. The bureaucratic mind can be a dilly, he decided. Was the fact that she was a rather delicately constructed girl a factor? He felt the weight of the Model-H gun nestled under his left armpit. Perhaps in the clutch Section G preferred men as agents.

They swooped into a landing that brought them as close to the control tower as was practical. In a matter of moments there was a guard of twenty or more sloppily uniformed men about their small craft.

Tog made a *moue*. "Welcoming committee," she said.

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They climbed out the circular port, and flashed their United Planets Bureau of Investigation badges to the youngish looking soldier who seemed in command. He was indecisive.

"United Planets?" he said. "All I know is I'm supposed to arrest anybody landing."

Ronny snapped. "We're to be taken immediately to United Planets headquarters."

"Well, I don't know about that. I don't take orders from foreigners."

One of his men was nervously fingering the trigger of his submachine gun.

Ronny's mouth went dry. He had the feeling of being high, high on a rock face, inadequately belayed from above.

Tog said smoothly, "But, major, I'm sure whoever issued your orders had no expectation of a special delegation from the United Planets coming to congratulate your new authorities on their success. Of course, it's unknown to arrest a delegation from United Planets."

"It is?" he frowned at her. "I mean, you are?"

"Yes," Tog said sweetly.

Ronny took the hint. "Where can we find a vehicle, major, to get us to the capital and to United Planets headquarters? Evidently we arrived before we were expected. There should have been a big welcoming committee here."

"Oh," the obviously recently promoted lad said hesitantly. "Well, I suppose we can make arrangements. This way please." He grinned at Tog as they walked toward the administration building. "Do all girls dress like you on Earth?"

"Well, no," she said demurely.

"That's too bad," he said gallantly.

"Why, major!" Tog said, keeping her eyes on the tarmac.

At the administration building there was little of order, but eventually they managed to arrange for their transportation. Luckily, they were

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supplied with a chauffeur driven helio-car.

Luckily, because without the chauffeur to help them run the gauntlet they would have been held up by parades, demonstrations and monstrous street meetings a dozen times before they ever reached their destination. Twice, Ronny stopped short of drawing his gun only by a fraction when half drunken demonstraters stopped them.

The driver, a wispy, sad looking type, shook his head. "There's no going back now," he told them over his shoulder. "No going back. Last week I was all with the rest, I never did believe David the One was really immortal. But you was just used to the idea, see? It'd always been that way, with the priests running everything and we was used to it. Now I wish we was still that way. At least you knew how you stood, see? Now, what's going to happen?"

"That's an interesting question," Tog said politely.

Ronny said, "Possibly you'll have the chance to build a better world, now."

The driver shot a contemptuous look over his shoulder. "Better world? What do I want with a better world? I just don't want to be bothered. I've been getting my three squares a day, got a nice little flat for my family. How do I know it's not going to be a worse world?"

"That's always a possibility," Tog told him. "Do most people seem to feel the same?"

"Practically everybody I know does," he said glumly. "But the fat's in the fire now. The priests are trying to hold on but their government is falling apart all over the place."

"Well," Ronny said, "at least you can figure just about anything in the way of a new government will be better than one based on superstition and inquisition. It couldn't get worse."

"Things can always get worse," the other contradicted him sadly.

They left the cab before an impressively tall, many windowed building in city center. As they mounted the steps, Ronny frowned at her. "You seemed to be encouraging that man in his pessimism. So far as I can see, the best thing that ever happened to this planet was toppling that phony priesthood."

"Perhaps," she said agreeably. "However, the man's mind was an ossified one. A surprisingly large percentage of people have them, especially when it comes to institutions such as religion and government. We weren't going to be able to teach him anything, but it was possible to learn from him."

Ronny grunted his disgust. "What could we possibly learn from him?"

Tog said mildly, "We could learn what people of the street were thinking. It might give us some ideas about what direction the new government will take."

They approached the portals of the building and were halted by an armed Space Forces guard of half a dozen men. Their sergeant saluted, taking in their obvious other-planet clothing.

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"Identifications, please," he said briskly.

They showed their badges and were passed on through. Ronny said to him, "Much trouble, sergeant?"

The other shrugged. "No. Just precautions, sir. We've been here only three or four weeks. Civil disturbance. We're used to it. Were over on Montezuma two basic months ago. Now there was *real* trouble. Had to shoot our way out."

Tog called, "Coming Ronny? I have this elevator waiting."

He followed her, scowling. An idea was trying to work its way through. Somehow he missed getting it.

Headquarters of the Department of Justice wer n the eighth floor. A receptionist clerk led them through three or four doors to the single office which housed Section G.

A red eyed, exhausted agent looked up from the sole desk and snarled a question at them. Ronny didn't get it, but Tog said mildly, "Probationary Agent Ronald Bronston and Tog Lee Chang Chu. On special assignment." She flicked open her badge so that the other could see it.

His manner changed. "Sorry," he said, getting up to shake hands. "I'm Mouley Hassan, in charge of Section G on New Delos. We've just had a crisis here, as you can imagine. The worst of it's now over." He added sourly, "I hope. All my assistants have already taken off for Avalon." He was a short statured, dark complected man, his features betraying his Semetic background.

Ronny shook hands with him and said, "Sorry to bother you at a time like this."

They found chairs and Mouley Hassan flicked a key on his order box and said to them, "How about a drink? They make a wonderful sparkling wine on this planet. Trust any theocracy to have top potables."

Ronny accepted the offer, Tog refused it politely. She sat demurely, her hands in her lap.

Mouley Hassan ran a weary hand through already mussed hair. "What's this special assignment you're on?"

Ronny said, "Commissioner Metaxa has sent me looking for Tommy Paine."

"Tommy Paine!" the other blurted. "At a time like this, when I haven't had three nights' sleep in the last three basic weeks, you come around looking for Tommy Paine?"

Ronny was taken aback. "Sid Jakes seemed to think this might be one of Paine's jobs."

Tog said mildly, "What better place to look for Tommy Paine, than in a situation like this, Agent Hassan?" Her eyebrows went up. "Or don't you think the quest for Paine is an important one?"

The other subsided somewhat. "I suppose you're right," he said. "I'm deathly tired. Do whatever you want. But don't expect much from me."

Tog said, just a trifle tartly, Ronny thought, "We'll have to call on you, as usual, Agent Hassan. There's probably no single job in Section G more important than the pursuit of Tommy Paine."

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"All right, all right," Mouley Hassan admitted. "I'll co-operate. How long have you been away from Earth?" he said to Ronny.

"About one basic week."

"Oh," he grunted. "This is your first stop, eh? Well. I don't envy you your job." He brought a cool bottle from a delivery drawer in the desk along with two glasses. "Here's the wine."

Ronny leaned forward to accept the glass. "This situation here," he said, "do you think it can be laid to Paine?"

Mouley Hassan shrugged wearily. "I don't know."

Ronny sipped the drink, looking at the tired agent over the glass rim. "From what we understand, check has been kept on all persons leaving the planet since the bombing."

"Check is right. There's only one ship that took off and it carried nobody except my assistant. If you ask me, I still needed them, but some brass hat back on Earth decided they were more necessary over on Avalon." He was disgusted.

Ronny put the glass down. "You mean only one ship's left this planet since the God-King was killed?"

"That's right. It was like pulling teeth to get the visas."

"How many men aboard?"

Mouley Hassan looked at him speculatively. "Four-man crew and six Section G operatives."

Tog said brightly, "Why, that means, then, that either Tommy Paine is still on this planet, or he's one of the passengers or crew members of that ship." She added, "That is, of course, unless he had a private craft, hidden away somewhere."

Roony slumped back into his chair as some of the ramifications came home to him. "If it was Tommy Paine at all," he said.

Mouley Hassan nodded. "That's always a point." He finished his glass and looked pleadingly at Tog. "Look, I have work. If I can finish some of it, I might have time for some sleep. Couldn't we postpone the search for Tommy Paine."

Tog said nothing to him.

Ronny came to his feet. "We'll get along. A couple of ideas occur to me. I'll check with you later."

"Fine," the agent said. He shook hands with them again. He said, somehow more to Tog than to Ronny, "I know how important your job is. It's just that I've been pushed to the point where I can't operate efficiently."

She smiled her understanding, gave him her small, delicate hand.

In the elevator, Ronny said to her, "Why should this sort of thing particularly affect Section G?"

Tog said, "It's times like this that planets drop out of the UP. Or, possibly, get into the hands of some jingoistic military group and start off halfcocked to provoke a war with some other planet, or to missionarize or propagandize it." She thought about it a moment. "A new revolution, in government or religion, seems almost invariably to want to spread the light. An absolute compulsion to bring to others the new truths

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that they've found." She added, her voice holding a trace of mockery. "Usually the new truths are rather hoary ones, and there are few interested in hearing them."

They spent their first day in getting accommodations in a centrally located hotel, in making arrangements, through the Department of Justice, for the local means of exchange—it turned out to be coinage, based on gold—and getting the feel of their surroundings.

Evidently Delos, the capital city of the planet New Delos, was but slowly emerging from the chaos that had taken over on the assassination. A provisional government, composed of representatives of half a dozen different organizations which had sprung up like mushrooms following the collapse of the regime, had assumed power. Elections had been promised and were to be brought off when arrangements could be made.

Meanwhile, the actual government was still largely in the hands of the lower echelons of the priesthood. A nervous priesthood it was, seemingly desirous of getting out from under while the going was good, afraid of being held responsible for former excesses.

Ronny Bronston, high hopes still in his head, looked up the Sub-Bishop who had given them landing orders while they were still aboard the Space Forces cruiser. Tog was off making arrangements for various details involved in their being in Delos in its time of crisis.

A dozen times, on his way over to keep his appointment with the official, Ronny had to step into doorways, or in other wise make himself inconspicuous. Gangs of demonstrators roamed the street, some of them drunken, looking for trouble, and scornful of police or the military. Twice, when it looked as though he might be roughed up, Ronny drew his gun and held it in open sight, ready for use, but not threateningly. The demonstrators made off.

His throat was dry by the time he reached his destination. The life of a Section G agent, on interplanetary assignment, had its drawbacks.

The Sub-Bishop had formerly been in charge of Interplanetary Communications which involved commerce as well as intercourse with United Planets. It must have been an ultra-responsible position only a month ago. Now his offices were all but deserted.

He looked at Ronny's badge, only vaguely interested. "Section G of the Bureau of Investigation," he said. "I don't believe I am aware of your responsibilities. However," he nodded with sour courtesy, "please be seated. You must forgive my lack of ability to offer refreshment. Isn't there an old tradition about rats deserting a sinking ship? I am afraid my former assistants had rodentlike instincts."

Ronny said, "Section G deals with Interplanetary Security, sir—"

"I am addressed as Holiness," the other said.

Ronny looked at him. "Sorry," he said. "I am a citizen of the United

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Planets, not any one planet, even Earth. UP citizens have complete religious freedom. In my case I am unaffiliated with any church."

The Sub-Bishop let it pass. He said sourly, "I am afraid that even here on New Delos, I am seldom honored by my title any more. Go on, you say you deal with Interplanetary Security."

"That's correct. In cases like this we're interested in checking to see if there is any possibility that citizens of planets other than New Delos are involved in your internal affairs."

The other's eyes were suddenly slits. He said, heavily, "You suspect that David the One was assassinated by an alien?"

Ronny had to tread carefully here. "I make no such suggestion. I am merely here to check on the possibility. If such was the case, my duty would be to arrest the man, or men."

"If we got hold of him, you'd have small chance of asserting your authority," the priest growled. "What did you want to know?"

"I understand that no interplanetary craft have left New Delos since the assassination."

"None except a United Planets ship which was carefully inspected."

Ronny said tightly, "But what facilities do you have to check on secret spaceports, possibly located in some remote desert or mountain area?"

The New Delian laughed sourly. "There is no other planet in all the United Planets with our degree of security. We even imported the most recent developments in artificial satellites equipped with the most delicate of detection devices. I assure you, it is utterly impossible for a spacecraft to land or take off from New Delos without our knowledge."

Ronny Bronston's eyes lit with excitement. "These security measures of yours. To what extent do you keep under observation all aliens on the planet?"

The priest's chuckle had a nasty quality. "You are quite ignorant of our institutions, evidently. Every person on New Delos, in every way of life, was under constant survey from the cradle to the grave. Aliens were highly discouraged. When they appeared on New Delos at all, they were restricted in their movements to this, our capital city."

Ronny let air whistle from his lungs. "Then," he said triumphantly, "if any alien had anything to do with this, he is still on the planet. Can you get me a list of all aliens?"

The other laughed again, still sourly. "But there are none. None except you employees of United Planets. I'm afraid you're on a wild-goose chase."

Ronny stared at him blankly. "But commercial representatives, cultural exchange—"

The priest said flatly, "No. None at all. All commerce was handled through UP. We encouraged no cultural exchanges. We wished to keep our people uncorrupted. United Planets alone had the right to land on our one spaceport."

The Section G agent came to his feet. This was much simpler than he

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could ever have hoped for. He thanked the other, but avoided the necessity of shaking hands, and left.

He found a helio-cab and dialed it to the UP building, finding strange the necessity of slipping coins into the vehicle's slots until the correct amount for his destination had been deposited. Coinage was no longer in use on Earth.

At the UP building he retraced his steps of the day before to the single office of Section G.

To his surprise, not only Mouley Hassan was there, but Tog as well. Hassan had evidently had at least a few hours of sleep. He was in better shape.

They exchanged the usual amenities and took their chairs again.

Hassan said, "We were just gossiping. It's been years since I've been in Greater Washington. Lee Chang tells me that Sid Jakes is now a Supervisor. I worked with him for a while, when I first joined Section G. How about a glass of wine?"

Ronny said, "Look. If Tommy Paine was connected with this, and it's almost positive he was, we've got him."

The others looked at him.

"You've evidently been busy," Tog said mildly.

He turned to her. "He's trapped, Tog! He can't get off the planet."

Mouley Hassan rubbed a hand through his hair. "It'd be hard, all right. They've got the people under rein here such as you've never seen before. Or they did until this blew up."

Ronny sketched the situation to Tog, winding up with, "The only thing that makes sense is that it's a Tommy Paine job. The local citizens would never have been able to get their hands on such a bomb, or been able to have made the arrangements for its delivery. They're under too much surveillance."

Tog said thoughtfully. "But how did he escape all this surveillance?"

"Don't you understand? He's working here, in this building, as an employee of UP. There is no other alternative."

They stared at him.

"I think perhaps you're right," Tog said finally.

Ronny turned to Mouley Hassan. "Can you get a list of all UP employees?"

"Of course." He flicked his order box, barked a command into it.

Ronny said, "It's going to be a matter of eliminating the impossible. For instance, what is the earliest known case of Tommy Paine's activity?"

Tog thought back. "So far as we know definitely, about twenty-two years ago."

"Fine," Ronny said, increasingly excited. "That will eliminate all persons less than, say, forty years of age. We can assume he was at least twenty when he began."

Hassan said, "Can we eliminate all women employees?"

Ronny said. "I'd think so. The few times he's been seen, all reports are of a man. And that case on the planet Mother where he put himself over as

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a Holy Man. He could hardly have been a woman in disguise in a Stone Age culture such as that."

Hassan said, "And this Tommy Paine has been flitting around this part of the galaxy for years, so anyone who has been here steadily for a period of even a couple of years or so, can't be suspect."

Mouley Hassan thrust his hand into a delivery drawer and brought forth a handful of punched cards, possibly fifty in all.

"Surely there's more people than that working in this building," Ronny protested.

Mouley Hassan said, "No. I've eliminated already everyone who is a citizen of New Delos. Obviously, Tommy Paine is an alien. We have only forty-eight Earthlings and other United Planets citizens working here."

He carried the cards to a small collator and worked for a moment on its controls, as Tog and Ronny watched him with mounting tension. "Let's see," he muttered. "We eliminate all women, all those less than forty, all who haven't done a great deal of travel, those who have been here for several years."

The end of it was that they eliminated everyone employed in the UP building.

The cards were stacked back on Mouley Hassan's desk again, and the three of them sat around and looked glumly at them.

Ronny said, "He's tinkered with the files. He counterfeited fake papers for himself, or something. Possibly he's pulled his own card and it isn't in this stack you have."

Mouley Hassan said, "We'll double-check all those possibilities, but you're wrong. Possibly a few hundred years ago, but not today. Forgery and counterfeiting are things of the past. And, believe me, the Bureau of Investigation and especially Section G, may look on the slipshod side, but they aren't. We're not going to find anything wrong with those cards. Tommy Paine simply is not working for UP on New Delos."

"Then," Ronny said, "there's only one alternative. He's on this UP ship going to, what was the name of its destination?"

"Avalon," Mouley Hassan said, his face thoughtful.

Tog said, "Do you have any ideas on the men aboard?"

Mouley Hassan said, "There were four crew men, and six of our agents."

Tog said, "Unless one of them has faked papers, the six agents are eliminated. That leaves the crew members. Do you know anything about them?"

Hassan shook his head.

Ronny said, "Let's communicate with Avalon. Tell our representatives there to be sure that none of the occupants of that ship leaves Avalon until we get there."

Mouley Hassan said, "Good idea." He turned to his screen and said into it, "Section G, Bureau of Investigation, on the Planet Avalon."

In moment the screen lit up. An elderly agent, as Section G agents seemed to go, looked up at them.

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Mouley Hassan held his silver badge so the other could see it and on the Avalon agent's nod said, "I'm Hassan from New Delos. We've just had a crisis here and and there seems to be a chance that it's a Tommy Paine job. Agent Bronston here is on an assignment tracking him down. I'll turn it over to Bronston."

The Avalon agent nodded again, and looked at Ronny.

Ronny said urgently, "We haven't the time to give you details, but every indication is that Paine is on a UP spacecraft with Avalon as its destination. There are only ten men aboard, and six of them are Section G operatives."

The other pursed his lips. "I see. You think you have the old fox cornered, eh?"

"Possibly," Ronny said. "There are various ifs. Miss Tog and I can double check here. Then as soon as we can clear exit visas, we'll make immediate way for Avalon."

The Avalon Section G agent said, "I haven't the authority to control the movements of other agents, they have as high rank as I have," he added, expressionlessly, "and probably higher than yours."

Ronny said, "But the four-man crew?"

The other said, "These men are coming to Avalon to work on a job that will take at least six months. We'll make a routine check, and I'll try and make sure the whole ten will still be on Avalon when and if you arrive."

They had to be satisfied with that.

They checked all ways from the middle, nor did it take long. There was no doubt. If this was a Tommy Paine job, and it almost surely was, then there was only one way in which he could have escaped from the planet and that was by the single spacecraft that had left, destination Avalon. He was not *on* the planet, that was definite Ronny felt. A stranger on New Delos was as conspicuous as a walrus in a goldfish bowl. There simply were no such.

They spent most of their time checking and rechecking United Planets personnel, but there was no question there either.

Mouley Hassan and others of UP personnel helped cut the red tape involved in getting exit visas from New Delos. It wasn't as complicated as it might have been a week or two before. No one seemed to be so confident of his authority in the new provisional government that he dared veto a United Planets request.

Mouley Hassan was able to arrange for a small space yacht, slower than a military craft, but capable of getting them to Avalon in a few days time. A one-man crew was sufficient, Ronny, and especially Tog, could spell him on the watches.

Time aboard was spent largely in studying up on Avalon, going over and over again anything known about the elusive Tommy Paine, and playing Battle Chess and bickering with Tog Lee Chang Chu.

If it hadn't been for this ability to argue against just about anything Ronny managed to say, he could have

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been attracted to her to the detriment of the job. She was a good traveler, few people are; she was an ultra-efficient assistant; she was a joy to look at; and she never intruded. But, Great Guns, the woman could bicker.

The two of them were studying in the ship's luxurious lounge when Ronny looked up and said, "Do you have any idea why those six agents were sent to Avalon?"

"No," she said.

He indicated the booklet he was reading. "From what I can see here, it sounds like one of the most advanced planets in the UP. They've made some of the most useful advances in industrial techniques of the past century."

"Oh, I don't know," Tog mused. "I haven't much regard for Industrial Feudalism myself. "It starts off with a bang, but tends to go sterile."

"Industrial feudalism," he said indignantly. "What do you mean? The government is a constitutional monarchy with the king merely a powerless symbol. The standard of living is high. Elections are honest and democratic. They've got a three-party system . . ."

"Which is largely phony," Tog interrupted. "You've got to do some reading between the lines, especially when the books you're reading are turned out by the industrial feudalistic publishing companies in Avalon."

"What's this industrial feudalism, you keep talking about? Avalon has a system of free enterprise."

"A gobbledygook term," Tog said, irritatingly. "Industrial feudalism is a socio-economic system that develops when industrial wealth is concentrat-

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ed into the hands of a comparatively few families. It finally gets to the point of a closed circle all but impossible to break into. These industrial feudalistic families become so powerful that only in rare instances can anyone lift himself into their society. They dominate every field, including the so-called labor unions, which amount to one of the biggest businesses of all. With their unlimited resources they even own every means of dispensing information."

"You mean," Ronny argued, "that on Avalon you can't start up a newspaper of your own and say whatever you wish?"

"Certainly you can, theoretically. If you have the resources. Unfortunately, such enterprises become increasingly expensive to start. Or you could start a radio, TV or Tri-Di station—if you had the resources. However, even if you overcame all your handicaps and your newspaper or broadcasting station became a success, the industrial feudalistic families in control of Avalon's publishing and broadcasting fields have the endless resources to buy you out, or squeeze you out, by one nasty means or another."

Ronny snorted. "Well, the people must be satisfied or they'd vote some fundamental changes."

Tog nodded. "They're satisfied, and no wonder. Since childhood every means of forming their opinions have been in the hands of industrial feudalistic families—including the schools."

"You mean the schools are private?"

"No, they don't have to be. The government is completely dominated by the fifty or so families which for all practical purposes own Avalon. That includes the schools. Some of the higher institutions of learning are private, but they, too, are largely dependent upon grants from the families."

Ronny was irritated by her know-all air. He tapped the book he'd been reading with a finger. "They don't control the government. Avalon's got a three-party system. Any time the people don't like the government, they can vote in an alternative."

"That's an optical illusion. There are three parties, but each is dominated by the fifty families, and election laws are such that for all practical purposes it's impossible to start another party. Theoretically it's possible, actually it isn't. The voters can vary back and forth between the three political parties but it doesn't make any difference which one they elect. They all stand for the same thing—a continuation of the status quo."

"Then you claim it isn't democracy at all?"

Tog sighed. "That's a much abused word. Actually, pure democracy is seldom seen. They pretty well had it in primitive society where government was based on the family. You voted for one of your relatives in your clan to represent you in the tribal councils. Every one in the tribe was equal so far as apportionments of the necessities of life were concerned. No one, even the tribal chiefs, ate

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better than anyone else, no one had a better home."

Ronny said, snappishly, "And if man had remained at that level, we'd never have gotten anywhere."

"That's right," she said. "For progress, man needed a leisure class. Somebody with the time to study, to experiment, to work things out."

He said, "We're getting away from the point. You said in spite of appearances they don't have democracy on Avalon."

"They have a pretense of it. But only free men can practice democracy. So long as your food, clothing and shelter are controlled by someone else, you aren't free. Wait until I think of an example." She put her right forefinger to her chin, thoughtfully.

Holy smokes, she was a cute trick. If only she wasn't so confounded irritating.

Tog said, "Do you remember the State of California in Earth history?"

"I think so. On the west coast of North America."

"That's right. Well, back in the Twentieth Century, Christian calendar, they had an economic depression. During it a crackpot organization called Thirty Dollars Every Thursday managed to get itself on the ballot. Times were bad enough but had this particular bunch got into power it would have become chaotic. At first no thinking person took them seriously, however a majority of people in California at that time had little to lose and in the final week or so of the election campaign the polls showed that Thirty Dollars Every Thursday was going to win. So, a few days before voting many of the larger industries and businesses in the State ran full page ads in the newspapers. They said substantially the same thing. *If Thirty Dollars Every Thursday wins this election, our concern will close its doors. Do not bother to come back to work Monday.*"

Ronny was scowling at her. "What's your point?"

She shrugged delicate shoulders. "The crackpots were defeated, of course, which was actually good for California. But my point is that the voters of California were not actually free since their livelihoods were controlled by others. This is an extreme case, of course, but the fact always applies."

A thought suddenly hit Ronny Bronston. "Look," he said. "Tommy Paine. Do you think he's merely escaping from New Delos, or is it possible that Avalon is his next destination? Is he going to try and overthrow the government there?"

She was shaking her head, but frowning. "I don't think so. Things are quite stable on Avalon."

"Stable?" he scowled at her. "From what you've just been saying, they're pretty bad."

She continued to shake her head. "Don't misunderstand, Ronny. On an assignment like this, it's easy to get the impression that all the United Planets are in a state of socio-political confusion, but it isn't so. A small minority of planets are ripe for the

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sort of trouble Tommy Paine stirs up. Most are working away, developing, making progress, slowly evolving. Avalon is one of these. The way things are there, Tommy Paine couldn't make a dent on changing things, even if he wanted to, and there's no particular reason to believe he does."

Ronny growled. "From what I can learn of the guy he's anxious to stir up trouble wherever he goes."

"I don't know. If there's any pattern at all in his activities, it seems to be that he picks spots where things are ripe to boil over on their own. He acts as a catalyst. In a place like Avalon he wouldn't get to first base. Possibly fifty years from now, things will have developed on Avalon to the point where there is dissatisfaction. By that time," she said dryly, "we'll assume Tommy Paine will no longer be a problem to the Commissariat of Interplanetary Affairs for one reason or the other."

Ronny took up his book again. He growled, "I can't figure out his motivation. If I could just put my finger on that."

For once she agreed with him. "I've got an idea, Ronny, that once you have that, you'll have Tommy Paine."

They drew blank on Avalon.

Or, at least, it was drawn for them before they ever arrived.

The Section G agent permanently assigned to that planet had already checked and double checked the possibilities. None of the four-man crew of the UP spacecraft had been on New Delos at the time of the assassination of the God-King. They, and their craft, had been light-years away on another job.

Ronny Bronston couldn't believe it. He simply couldn't believe it.

The older agent, his name was Jheru Bulchand, was definite. He went over it with Ronny and Tog in a bar adjoining UP headquarters. He had dossiers on each of the ten men, detailed dossiers. On the face of it, none of them could be Paine.

"But one of them *has* to be," Ronny pleaded. He explained their method of eliminating the forty-eight employees of UP on New Delos.

Bulchand shrugged. "You've got holes in that method of elimination. You're assuming Tommy Paine is an individual, and you have no reason to. My own theory is that it's an organization."

Ronny said unhappily, "Then you're of the opinion that there is a Tommy Paine?"

The older agent was puffing comfortably on an old style briar pipe. He nodded definitely. "I believe Tommy Paine exists as an organization. Possibly once, originally, it was a single person, but now it's a group. How large, I wouldn't know. Probably not too large or by this time somebody would have betrayed it, or somebody would have cracked and we would have caught them. Catch one and you've got the whole organization what with our modern means of interrogation."

Tog said, "I've heard the opinion before."

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Jheru Bulchand pointed at Ronny with his pipe stem. "If its an organization, then none of that eliminating you did is valid. Your assassin could have been one of the women. He could have been one of the men you eliminated as too young—someone recently admitted to the Tommy Paine organization."

Ronny checked the last of his theories. "Why did Section G send six of its agents here?"

"Nothing to do with Tommy Paine," Bulchand said. "It's a different sort of crisis."

"Just for my own satisfaction, what kind of crisis?"

Bulchand sketched it quickly. "There are two Earth type planets in this solar system. Avalon was the first to be colonized and developed rapidly. After a couple of centuries, Avalonians went over and settled on Catalina. They eventually set up a government of their own. Now Avalon has a surplus of industrial products. Her economic system is such that she produces more than she can sell back to her own people. There's a glut."

Tog said demurely, "So, of course, they want to dump it in Catalina."

Bulchand nodded. "In fact, they're willing to give it away. They've offered to build railroads, turn over ships and aircraft, donate whole factories to Catalina's slowly developing economy."

Ronny said, "Well, how does that call for Section G agents?"

"Catalina has evoked Article Two of the UP Charter. No member planet of UP is to interfere with the internal political, socio-economic or religious affairs of another member planet. Avalon claims the Charter doesn't apply since Catalina belongs to the same solar system and since she's a former colony. We're trying to smooth the whole thing over, before Avalon dreams up some excuse for military action.

Ronny stared at him. "I get the feeling every other sentence is being left out of your explanation. It just doesn't make sense. In the first place, why is Avalon as anxious as all that to give away what sounds like a fantastic amount of goods?"

"I told you, they have a glut. They've overproduced and, as a result, they've got a king-size depression on their hands, or will have unless they find markets."

"Well, why not trade with some of the planets that want her products?"

Tog said as though reasoning with a youngster, "Planets outside her own solar system are too far away for it to be practical even if she had commodities they didn't. She needs a nearby planet more backward than herself, a planet like Catalina."

"Well, that brings us to the more fantastic question. Why in the world doesn't Catalina accept? It sounds to me like pure philantrophy on the part of Avalon."

Bulchand was wagging his pipe stem in a negative gesture. "Bronston, governments are never motivated by idealistic reasons. Individuals might be, and even small groups, but governments never. Governments,

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including that of Avalon, exist for the benefit of the class or classes that control them. The only things that motivate them are the interests of that class."

"Well, this sounds like an exception," Ronny said argumentatively. "How can Catalina lose if the Avalonians grant them railroads, factories and all the rest of it?"

Tog said, "Don't you see, Ronny? It givea Avalon a foothold in the Catalina economy. When the locomotives wear out on the railroad, new engines, new parts, must be purchased. They won't be available on Catalina because there will be no railroad industry because none will have ever grown up. Catalina manufacturers couldn't compete with that initial free gift. They'll be dependent on Avalon for future equipment. In the factories, when machines wear out, they will be replaceable only with the products of Avalon's industry."

Bulchand said, "There's an analogy in the early history of the United States. When its fledgling steel industry began, they set up a high tariff to protect it against British competition. The British were amazed and indignant, pointing out that they could sell American steel products at one third the local prices, if only allowed to do so. The United States said no thanks, it didn't want to be tied, industrially, to Great Britain's apron strings. And in a couple of decades American steel production passed England's. In a couple of more decades American steel production was many times that of England's and she was taking British markets away from her all over the globe."

"At any rate," Ronny said, "it's not a Tommy Paine matter."

Just for luck, though, Ronny and Tog double checked all over again on Bulchand's efforts. They interviewed all six of the Section G agents. Each of them carried a silver badge that gleamed only for the individual who possessed it. All of which eliminated the possibility that Paine had assumed the identity of a Section G operative. So that was out.

They checked the four crew members, but there was no doubt there, either. The craft had been far away at the time of the assassination on New Delos.

On the third day, Ronny Bronston, disgusted, knocked on the door of Tog's hotel room. The door screen lit up and Tog, looking out at him said, "Oh, come on in, Ronny, I was just talking to Earth."

He entered.

Tog had set up her Section G communicator on a desk top and Sid Jakes' grinning face was in the tiny, brilliant screen. Ronny approached close enough for the other to take him in.

Jakes said happily, "Hi, Ronny, no luck, eh?"

Ronny shook his head, trying not to let his face portray his feelings of defeat. This after all was a probationary assignment, and the supervisor had the power to send Ronny Bronston back to the drudgery of his office job at Population Statistics.

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"Still working on it. I suppose it's a matter of returning to New Delos and grinding away at the forty-eight employees of the UP there."

Sid Jakes pursed his lips. "I don't know. Possibly this whole thing was a false alarm. At any rate, there seems to be a hotter case on the fire. If our local agents have it straight, Paine is about to pull one of his coups on Kropotkin. This is a top-top-secret, of course, one of the few times we've ever detected him before the act."

Ronny was suddenly alert, his fatigue of disgust of but a moment ago, completely forgotten. "Where?" he said.

"Kropotkin," Jakes said. "One of the most backward planets in UP and seemingly a setup for Paine's sort of trouble making. The authorities, if you can use the term applied to Kropotkin, are already complaining, threatening to invoke Article One of the Charter, or to resign from UP." Jake looked at Tog again. "Do you know Kropotkin, Lee Chang?"

She shook her head. "I've heard of it, rather vaguely. Named after some old anarchist, I believe."

"That's the place. One of the few anarchist societies in UP. You don't hear much from them." He turned to Ronny again. "I think that's your bet. Hop to it, boy. We're going to catch this Tommy Paine guy, or organization, or whatever, soon or United Planets is going to know it. We can't keep the lid on indefinitely. If word gets around of his activities, then we'll lose member planets like Christmas trees shedding needles after New Year's." He grinned widely. "That sounds like a neat trick, eh?"

Ronny Bronston had got to the point where he avoided controversial subjects with Tog even when provoked and she had a sneaky little way of provoking arguments. They had only one really knock down and drag-out verbal battle on the way to Kropotkin.

It had started innocently enough after dinner on the space liner on which they had taken passage for the first part of the trip. To kill time they were playing Battle Chess with its larger board and added contingents of pawns and castles.

Ronny said idly, "You know, in spite of the fact that I'm a third generation United Planets citizen and employee, I'm just beginning to realize how far out some of our member planets are. I had no idea before."

She frowned in concentration, before moving. She was advancing her men in echelon attack, taking losses in exchange for territory and trying to pen him up in such small space that he couldn't maneuver.

She said, "How do you mean?"

Ronny lifted and dropped a shoulder. "Well, New Delos and its theocracy, for instance, and Shangri-La and Mother and some of the other planets with extremes in government or socio-economic system. I hadn't the vaguest idea about such places."

She made a deprecating sound. "You should see Amazonia, or, for that matter, the Orwellian State."

"Amazonia," he said, "does that

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mean what it sounds like it does?"

She made her move and settled back in satisfaction. Her pawns were in such position that his bishops were both unusable. He'd tried to play a phalanx game in the early stages of her attack, but she'd broken through, rolling up his left flank after sacrificing a castle and knight.

"Certainly does," she said. "A fairly recently colonized planet. A few thousand feminists no men at all—moved onto it a few centuries ago. And it's still an out and out matriarchy."

Ronny cleared his throat delicately. "Without men . . . ah, how did they continue several centuries?"

Tog suppressed her amusement. "Artificial insemination, at first, so I understand. They brought their, ah, supply with them. But then there were boys among the first generation on the new planet and even the Amazonians weren't up to cold bloodedly butchering their children. So they merely enslaved them. Nice girls."

Ronny stared at her. "You mean all men are automatically slaves on this planet?"

"That's right."

Ronny made an improperly thought out move, trying to bring up a castle to reinforce his collapsing flank. He said, "UP allows *anybody* to join evidently," and there was disgust in his voice.

"Why not?" she said mildly.

"Well, there should be *some* standards."

Tog moved quickly, dominating with a knight several squares he couldn't afford to lose. She looked up at him, her dark eyes sparking. "The point of UP is to include all the planets. That way at least conflict can be avoided and some exchange of science, industrial techniques and cultural gains take place. And you must remember that while in power practically no socio-economic system will admit to the fact that it could possibly change for the better. But actually there is nothing less stable. Socio-economic systems are almost always in a condition of flux. Planets such as Amazonia might for a time seem so brutal in their methods as to exclude their right to civilized intercourse with the rest. However, one of these days there'll be a change—or one of these centuries. They all change, sooner or later." She added softly, "Even Han."

"Han?" Ronny said.

Her voice was quiet. "Where I was born, Ronny. Colonized from China in the very early days. In fact, I spent my childhood in a commune." She said musingly, "The party bureaucrats thought their system an impregnable, unchangeable one. Your move."

Ronny was fascinated. "And what happened?" He was in full retreat now, and with nowhere to go, his pieces pinned up for the slaughter. He moved a pawn to try and open up his queen.

"Why don't you concede?" she said. "Tommy Paine happened."

"Paine!"

"Uh-huh. It's a long story. I'll tell you about it some time." She pressed closer with her own queen.

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He stared disgustedly at the board. "Well, that's what I mean," he muttered. "I had no idea there were so many varieties of crackpot politico-economic systems among the UP membership."

"They're not necessarily crackpot," she protested mildly. "Just at different stages of development."

"Not crackpot!" he said. "Here we are heading for a planet named Kropotkin which evidently practices anarchy."

"Your move," she said. "What's wrong with anarchism?"

He glowered at her, in outraged disgust. Was it absolutely impossible for him to say anything without her disagreement?

Tog said mildly, "The anarchistic ethic is one of the highest man has ever developed." She added, after a moment of pretty consideration. "Unfortunately, admittedly, it hasn't been practical to put to practice. It will be interesting to see how they have done on Kropotkin."

"Anarchist ethic, yet," Ronny snapped. "I'm no student of the movement but the way I understand it, there isn't any."

Tog smiled sweetly. "The belief upon which they base their teachings is that no man is capable of judging another."

Ronny cast his eyes ceilingward. "O.K., I give up!"

She began rapidly resetting the pieces. "Another game?" she said brightly.

"Hey! I didn't mean the game! I was just about to counterattack."

"Ha!" she said.

The Section G agent on Kropotkin was named Hideka Yamamoto, but he was on a field tour and wouldn't be back for several days. However, there wasn't especially any great hurry so far as Ronny Bronston and Tog Lee Chang Chu knew. They got themselves organized in the rather rustic equivalent of a hotel, which was located fairly near UP headquarters, and took up the usual problems of arranging for local exchange, meals, means of transportation and such necessities.

It was a greater problem than usual. In fact, hadn't it been for the presence of the UP organization, which had already gone through all this the hard way, some of the difficulties would have been all but insurmountable.

For instance, there was no local exchange. There was no medium of exchange at all. Evidently simple barter was the rule.

In the hotel—if it could be called a hotel—lobby, Ronny Bronston looked at Tog. "Anarchism!" he said. "Oh, great. The highest ethic of all. And what's the means of transportation on this wonderful planet? The horse. And how are we going to get a couple of horses with no means of exchange?"

She tinkled laughter.

"All right," he said. "You're the Man Friday. You find out the details and handle them. I'm going out to take a look around the town—if you can call this a town."

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"It's the capital of Kropotkin," Tog said placatingly, though with a mocking background in her tone. "Name of Bakunin. And very pleasant, too, from what little I've seen. Not a bit of smog, industrial fumes, street dirt, street noises—"

"How could there be?" he injected disgustedly. "There isn't any industry, there aren't any cars, and for all practical purposes, no streets. The houses are a quarter of a mile or so apart."

She laughed at him again. "City boy," she said. "Go on out there and enjoy nature a little. It'll do you good. Anybody who has cooped himself up in that one big city, Earth, all his life ought to enjoy seeing what the great outdoors looks like."

He looked at her and grinned. She was cute as a pixie, and there were no two ways about that. He wondered for a moment what kind of a wife she'd make. And then shuddered inwardly. Life would be one big contradiction of anything he managed to get out of his trap.

He strolled idly along what was little more than a country path and it came to him that there were probably few worlds in the whole UP where he'd have been prone to do this within the first few hours he'd been on the planet. He would have been afraid, elsewhere, of anything from footpads to police, from unknown vehicles to unknown traffic laws. There was something bewildering about being an Earthling and being set down suddenly in New Delos or on Avalon.

Here, somehow, he already had a feeling of peace.

Evidently, although Bakunin was supposedly a city, its populace tilled their fields and provided themselves with their own food. He could see no signs of stores or warehouses. And the UP building, which was no great edifice itself, was the only thing in town which looked even remotely like a governmental building.

Bakunin was neat. Clean as a pin, as the expression went. Ronny was vaguely reminded of a historical Tri-Di romance he'd once seen. It had been laid in ancient times in a community of the Amish in old Pennsylvania.

He approached one of the wooden houses. The thing would have been priceless on Earth as an antique to be erected as a museum in some crowded park. For that matter it would have been priceless for the wood it contained. Evidently, the planet Kropotkin still had considerable virgin forest.

An old-timer smoking a pipe, sat on the cottage's front step. He nodded politely.

Ronny stopped. He might as well try to get a little of the feel of the place. He said courteously, "A pleasant evening."

The old-timer nodded. "As evenings should be after a fruitful day's toil. Sit down, comrade. You must be from the United Planets. Have you ever seen Earth?"

Ronny accepted the invitation and felt a soothing calm descend upon him almost immediately. An almost

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disturbingly pleasant calm. He said, "I was born on Earth."

"Ai?" the old man said. "Tell me. The books say that Kropotkin is an Earth type planet within what they call a few degrees. But is it? Is Kropotkin truly like the mother planet?"

Ronny looked about him. He'd seen some of this world as the shuttle rocket had brought them down from the passing liner. The forests, the lakes, the rivers, and the great sections untouched by man's hands. Now he saw the areas between homes, the neat fields, the signs of human toil—the toil of hands, not machines.

"No," he said, shaking his head. "I'm afraid not. This is how Earth must once have been. But no longer."

The other nodded. "Our total population is but a few million," he said. Then, "I would like to see the mother planet, but I suppose I never shall."

Ronny said diplomatically, "I have seen little of Kropotkin thus far but I am not so sure but that I might not be happy to stay here, rather than ever return to Earth."

The old man knocked the ashes from his pipe by striking it against the heel of a work-gnarled hand. He looked about him thoughtfully and said, "Yes, perhaps you're right. I am an old man and life has been good. I suppose I should be glad that I'll unlikely live to see Kropotkin change."

"Change? You plan changes?"

The old man looked at him and there seemed to be a very faint bitterness, politely suppressed. "I wouldn't say *we* planned them, comrade. Certainly not we of the older generation. But the trend toward change is already to be seen by anyone who wishes to look, and our institutions won't long be able to stand. But, of course, if you're from United Planets you would know more of this than I."

"I'm sorry. I don't know what you're talking about."

"You are new indeed on Kropotkin," the old man said. "Just a moment." He went into his house and emerged with a small power pack. He indicated it to Ronny Bronston. "This is our destruction," he said.

The Section G agent shook his head, bewildered.

The old-timer sat down again. "My son," he said, "runs the farm now. Six months ago, he traded one of our colts for a small pump, powered by one of these. It was little use on my part to argue against the step. The pump eliminates considerable work at the well and in irrigation."

Ronny still didn't understand.

"The power pack is dead now," the old man said, "and my son needs a new one."

"They're extremely cheap," Ronny said. "An industrialized planet turns them out in multi-million amounts at practically no cost."

"We have little with which to trade. A few handicrafts, at most."

Ronny said, "But, good heavens, man, build yourselves a plant to manufacture power packs. With a population this small, a factory employing no more than half a dozen

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men could turn out all you need."

The old man was shaking his head. He held up the battery. "This comes from the planet Archimedes," he said, "one of the most highly industrialized in the UP, so I understand. On Archimedes do you know how many persons it takes to manufacture this power pack?"

"A handful to operate the whole factory, Archimedes is fully automated."

The old man was still moving his head negatively. "No. It takes the total working population of the planet. How many different metals do you think are contained in it, in all? I can immediately see what must be lead and copper."

Ronny said uncomfortably, "Probably at least a dozen, some in microscopic amounts."

"That's right. So we need a highly developed metallurgical industry before we can even begin. Then a developed transportation industry to take metals to the factory. We need power to run the factory, hydroelectric, solar or possibly atomic power. We need a tool-making industry to equip the factory, the transport industry and the power industry. And while the men are employed in these, we need farmers to produce food for them, educators to teach them the sciences and techniques involved, and an entertainment industry to amuse them in their hours of rest. As their lives become more complicated with all this, we need a developed medical industry to keep them in health."

The old man hesitated for a mo-

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ment, then said, "And, above all, we need a highly complicated government to keep all this accumulation of wealth in check and balance. No. You see, my friend, it takes *social labor* to produce products such as this, and thus far we have avoided that on Kropotkin. In fact, it was for such avoidance that my ancestors originally came to this planet."

Ronny said, scowling, "This gets ridiculous. You show me this basically simple power pack and say it will ruin your socio-economic system. On the face of it, it's ridiculous."

The old man sighed and looked out over the village unseeingly. "It's not just that single item, of course. The other day one of my neighbors turned up with a light bulb with built-in power for a year's time. It is the envy of the unthinking persons of the neighborhood most of whom would give a great deal for such a source of light. A nephew of mine has somehow even acquired a powered bicycle, I think you call them, from somewhere or other. One by one, item by item, these products of advanced technology turn up—from whence, we don't seem to be able to find out."

Under his breath, Ronny muttered, *"Paine!"*

"I beg your pardon," the old man said.

"Nothing," the Section G agent said. He leaned foward and, a worried frown working its way over his face, began to question the other more closely.

Afterwards, Ronny Bronston strode slowly toward the UP headquarters. There was only a small contingent of United Planets personnel on this little populated member planet but, as always, there seemed to be an office for Section G.

Ronny stood outside it for a moment. There were voices from within, but he didn't knock.

In fact, he cast his eyes up and down the short corridor. At the far end was a desk with a girl in the Interplanetary Cultural Exchange Department working away in concentration. She wasn't looking in his direction.

Ronny Bronston put his ear to the door. The building was primitive enough, rustic enough in its construction, to permit his hearing.

Tog Lee Chang Chu was saying seriously, "Oh, it was chaotic all right, but no, I don't really believe it could have been a Tommy Paine case. Actually I'd suggest to you that you run over to Catalina. When I was on Avalon I heard rumors that Tommy Paine's finger seemed to be stirring around in the mess there. Yes, I'd recommend that you take off for Catalina immediately. If Paine is anywhere in this vicinity at all, it would be Catalina."

For a moment, Ronny Bronston froze. Then in automatic reflex his hand went inside his jacket to rest over the butt of the Model H automatic there.

No, that wasn't the answer. His hand dropped away from the gun.

He listened, further.

Another voice was saying, "We

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thought we were on the trail for a while on Hector, but it turned out it wasn't Paine. Just a group of local agitators fed up with the communist regime there. There's going to be a blood bath on Hector, before they're through, but it doesn't seem to be Paine's work this time."

Tog's voice was musing. "Well, you never know, it sounds like the sort of muck he likes to play in."

The strange voice said argumentatively, "Well, Hector *needs* a few fundamental changes."

"It could be," Tog said, "but that's their internal affairs, of course. Our job in Section G is to prevent troubles between the differing socio-economic and religious features of member planets. Whatever we think of some of the things Paine does, our task is to get him."

Ronny Bronston pushed the door open and went through. Tog Lee Chang Chu was sitting at a desk, nonchalant and petitely beautiful as usual. comfortably seated in easy-chairs were two young men by their attire probably citizens of United Planets and possibly even Earthlings.

"Hello, Ronny," Tog said softly. "Meet Frederic Lippman and Pedro Nazaré, both Section G operatives. This is my colleague, Ronald Bronston, gentlemen. Fredric and Pedro were just leaving, Ronny."

The two agents got up to shake hands.

Ronny said, "You can't be in that much of a hurry. What's your assignment, boys?"

Lippman, an earnest type, and by his appearance not more than twenty-five or so years of age, began to answer, but Nazaré said hurriedly, "Actually, it's a confidential assignment. We're working directly out of the Octagon."

Lippman said, frowning, "It's not *that* confidential, Tog. Bronston's an agent, too. What's your assignment, Ronny?"

Ronny said very slowly, "I'm beginning to suspect that it's the same as yours and various pieces are beginning to fall into place."

Lippman was taken aback. "You mean you're looking for Tommy Paine?" His eyes went to his associate. "How could that be, Tog? I didn't know more than one of us were on this job. Why, that means if Bronston here finds him first, I won't get my permanent appointment."

Ronny looked at Tog Lee Chang Chu who was sitting demurely, hands in lap, and a resigned expression on her face. He said, "Nor if you find him first, will I. Look here, Tog, how many men does Sid Jakes have out on this assignment?"

"I wouldn't know," she said mildly.

He snapped, "A few dozen or so? Or possibly a few hundred?"

"It seems unlikely there could be that many," she said mildly. She looked at the other two agents. "I think you two had better run along. Take my suggestion I made earlier."

"Wait a minute," Ronny snapped. "You mean that they go to Catalina? That's ridiculous."

Tog Lee Chang Chu looked at

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Pedro Nazaré and he turned and started for the door followed by Fredric Lippman who was still scowling his puzzlement.

"Wait a minute!" Ronny snapped. "I tell you it's ridiculous. And why follow her suggestions? She's just my assistant."

Pedro Nazaré said, "Come on, Fred, let's get going, we'll have to pack." But Lippman wasn't having any.

"His assistant?" he said to Tog Lee Chang Chu.

Tog Lee Chang Chu's face changed expression in sudden decision. She opened her bag and brought forth a Section G identification wallet and flicked it open. The badge was gold. "I suggest you hurry," she said to the two agents.

They left, and Tog turned back to Ronny, her eyebrows raised questioningly.

Ronny sank down into one of the chairs recently occupied by the other two agents and tried to unravel thoughts. He said finally, "I suppose my question should be, why do Ross Metaxa and Sid Jakes send an agent of supervisor rank to act as assistant to a probationary agent? But that's not what I'm asking yet. First, Lippman just called his buddy Tog. How come?"

Tog took her seat again, rueful resignation on her face. "You should be figuring it out on your own by this time, Ronny."

He looked at her belligerently. "I'm too stupid, eh?" The anger was growing within him.

"Tog," she said. "It's a nickname, or possibly you might call it a title. Tog. T-O-G. The Other Guy. My name is Lee Chang Chu, and I'm of supervisor grade presently working at developing new Section G operatives. Considering the continuing rapid growth of UP, and the continuing crises that come up in UP activities, developing new operatives is one of the department's most pressing jobs. Each new agent, on his first assignment, is always paired with an experienced old-timer."

"I see," he said flatly. "Your principal job being to needle the fledging, eh?"

She lowered her eyes. "I wouldn't exactly word it that way," she said. She was obviously unrepentant.

He said, "You must get a lot of laughs out of it. If I say, it seems to me democracy is a good thing, you give me an argument about the superiority of rule by an elite. If I say anarchism is ridiculous, you dredge up an opinion that it's man's highest ethic. You must laugh yourself to sleep at nights. You and Metaxa and Jakes and every other agent in Section G. Everybody is in on the Tog gag but the sucker."

"Sometimes there are amusing elements to the work," Lee Chang conceded, demurely.

"Just one more thing I'd like to ask," Ronny rapped. "This first assignment, agents are given. Is it always to look for Tommy Paine?"

She looked up at him, said nothing, but her eyes were questioning.

"Don't worry," he snapped. "I've already found out who Paine is."

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"Ah?" She was suddenly interested. "Then I'm glad I ordered that other probationary agent to leave. Evidently, he hasn't. Obviously, I didn't want the two of you comparing notes."

"No, that would never do," he said bitterly. "Well, this is the end of the assignment so far as you and I are concerned. I'm heading back for Earth."

"Of course," she said.

He had time on the way to think it all over, and over and over again, and a great deal of it simply didn't make sense. He had enough information to be disillusioned, sick at heart. To have crumbled an idealistic edifice that had taken a lifetime to build. A lifetime? At least three. His father and his grandfather before him had had the dream. He'd been weaned on the idealistic purposes of the United Planets and man's fated growth into the stars.

He was a third-generation dreamer of participating in the glory. His grandfather had been a citizen of Earth and gave up a commercial position to take a job that amounted to little more than a janitor in an obscure department of Interplanetary Financial Clearing. He wanted to get into the big job, into space, but never made it. Ronny's father managed to work up to the point where he was a supervisor in Interplanetary Medical Exchange, in the tabulating department. He, too, had wanted into space, and never made it. Ronny had loved them both. In a way fulfilling his own dreams had been a debt he owed them, because at the same time he was fulfilling theirs.

And now this. All that had been gold, was suddenly gilted lead. The dream had become contemptuous nightmare.

Finally back in Greater Washington, he went immediately from the shuttleport to the Octagon. His Bureau of Investigation badge was enough to see him through the guide-guards and all the way through to the office of Irene Kasansky.

She looked up at him quickly. "Hi," she said. "Ronny Bronston, isn't it?"

"That's right. I want to see Commissioner Metaxa."

She scowled. "I can't work you in now. How about Sid Jakes?"

He said, "Jakes is in charge of the Tommy Paine routine, isn't he?"

She shot a sharper look up at him. "That's right," she said warily.

"All right," Ronny said. "I'll see Jakes."

Her deft right hand slipped open a drawer in her desk. "You'd better leave your gun here," she said. "I've known probationary agents to get excited, in my time."

He looked at her.

And she looked back, her gaze level.

Ronny Bronston shrugged, slipped the Model H from under his armpit and tossed it into the drawer.

Irene Kasansky went back to her work. "You know the way," she said.

This time Ronny Bronston pushed open the door to Sid Jakes' office with-

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out knocking. The Section G supervisor was poring over reports on his desk. He looked up and grinned his Sid Jakes' grin.

"Ronny!" he said. "Welcome back. You know, you're one of the quickest men ever to return from a Tommy Paine assignment. I was talking to Lee Chang only a day or so ago. She said you were on your way."

Ronny grunted, his anger growing within him. He lowered himself into one of the room's heavy chairs, and glared at the other.

Sid Jakes chuckled and leaned back in his chair. "Before we go any further, just to check, who is Tommy Paine?"

Ronny snapped, "You are."

The supervisor's eyebrows went up.

Ronny said, "You and Ross Metaxa and Lee Chang Chu—and all the rest of Section G. Section G is Tommy Paine."

"Good man!" Sid Jakes chortled. He flicked a switch on his order box. "Irene," he said, "how about clearing me through to the commissioner? I want to take Ronny in for his finals."

Irene snapped back something and Sid Jakes switched off and turned to Ronny happily. "Let's go," he said. "Ross is free for a time."

Ronny Bronston said nothing. He followed the other. The rage within him was still mounting.

In the months that had elapsed since Ronny Bronston had seen Ross Metaxa the latter had changed not at all. His clothing was still sloppy, his eyes bleary with lack of sleep or abundance of alcohol—or both. His expression was still sour and skeptical.

He looked up at their entry and scowled, and made no effort to rise and shake hands. He said to Ronny sourly, "O.K., sound off and get it over with. I haven't too much time this afternoon."

Ronny Bronston was just beginning to feel tentacles of cold doubt, but he suppressed them. The boiling anger was uppermost. He said flatly, "All my life I've been a dedicated United Planets man. All my life I've considered its efforts the most praiseworthy and greatest endeavor man has ever attempted."

"Of course, old chap," Jakes told him cheerfully. "We know all that, or you wouldn't ever have been chosen as an agent for Section G."

Ronny looked at him in disgust. "I've resigned that position, Jakes."

Jakes grinned back at him. "To the contrary, you're now in the process of receiving permanent appointment."

Ronny snorted his disgust and turned back to Metaxa. "Section G is a secret department of the Bureau of Investigation devoted to subverting Article One of the United Planets Charter."

Metaxa nodded.

"You don't deny it?"

Metaxa shook his head.

"Article One," Ronny snapped, "is the basic foundation of the Charter which every member of UP and particularly every citizen of United Planets, such as ourselves, has sworn to uphold. But the very reason for the existence of this Section G is to interfere with the internal affairs of

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member planets, to subvert their governments, their economic systems, their religions, their ideals, their very way of life."

Metaxa yawned and reached into a desk drawer for his bottle. "That's right," he said. "Anybody like a drink?"

Ronny ignored him. "I'm surprised I didn't catch on even sooner," he said. "On New Delos Mouley Hassan, the local agent, knew the God-King was going to be assassinated. He brought in extra agents and even a detail of Space Forces guards for the emergency. He probably engineered the assassination himself."

"Nope," Jakes said. "We seldom go *that* far. Local rebels did the actual work, but, admittedly, we knew what they were planning. In fact, I've got a sneaking suspicion that Mouley Hassan provided them with the bomb. That lad's a bit too dedicated."

"But *why*," Ronny blurted. "That's deliberately interfering with internal affairs. If the word got out, every planet in UP would resign."

"Probably no planet in the system that needed a change so badly," Metaxa growled. "If they were ever going to swing into real progress, that hierarchy of priests had to go." He snorted. "An immortal God-King, yet."

Ronny pressed on. "That was bad enough, but how about this planet Mother, where the colonists had attempted to return to nature and live in the manner man did in earliest times."

"Most backward planet in the UP," Metaxa said sourly. "They just had to be roused."

"And Kropotkin!" Ronny blurted. "Don't you understand, those people were *happy* there. Their lives were simple, uncomplicated, and they had achieved a happiness that—"

Metaxa came to his feet. He scowled at Ronny Bronston and growled, "Unfortunately, the human race can't take the time out for happiness. Come along. I want to show you something."

He swung around the corner of his desk and made his way toward a ceiling-high bookcase.

Ronny stared after him, taken off guard, but Sid Jakes was grinning his amusement.

Ross Metaxa pushed a concealed button and the bookcase slid away to one side to reveal an elevator beyond.

"Come along," Metaxa repeated over his shoulder. He entered the elevator, followed by Jakes.

There was nothing else to do. Ronny Bronston followed them, his face still flushed with the angered argument.

The elevator dropped, how far, Ronny had no idea. It stopped and they emerged into a plain, sparcely furnished vault. Against one wall was a boxlike affair that reminded Ronny of nothing so much as a deep-freeze.

For all practical purposes, that's what it was. Ross Metaxa led him over and they stared down into its glass-covered interior.

Ronny's eyes bugged. The box con-

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tained the partly charred body of an animal approximately the size of a rabbit. No, not an animal. It had obviously once been clothed, and its limbs were obviously those of a tool using life form.

Metaxa and Jakes were staring down at it solemnly, for once no inane grin on the supervisor's face. And that of Ross Metaxa was more weary than ever.

Ronny said finally, "What is it?" But he knew.

"You tell us," Metaxa growled sourly.

"It's an intelligent life form," Ronny blurted. "Why has it been kept secret?"

"Let's go on back upstairs," Metaxa sighed.

Back in his office he said, "Now I go into my speech. Shut up for a while." He poured himself a drink, not offering one to the other two. "Ronny," he said, "man isn't alone in the galaxy. There's other intelligent life. Dangerously intelligent."

In spite of himself Ronny reacted in amusement. "That little creature down there? The size of a small monkey?" As soon as he said it, he realized the ridiculousness of his statement.

Metaxa grunted. "Obviously, size means nothing. That little fellow down there was picked up by one of our Space Forces scouts over a century ago. How long he'd been drifting through space, we don't know. Possibly only months, but possibly hundreds of centuries. But however long he's proof that man is not alone in the galaxy. And we have no way of knowing when the expanding human race will come up against this other intelligence—and whoever it was fighting."

"But," Ronny protested, "you're assuming they're aggressive. Perhaps coming in contact with these aliens will be the best thing that ever happened to man. Possibly that little fellow down there is the most benevolent creature ever evolved."

Metaxa looked at him strangely. "Let's hope so," he said. "However, when found he was in what must have been a one-man scout. He was dead and his craft was blasted and torn—obviously from some sort of weapons' fire. His scout was obviously a military craft, highly equipped with what could only be weapons, most of them so damaged our engineers haven't been able to figure them out. To the extent they have been able to reconstruct them, they're scared silly. No, there's no two ways about it, our little rabbit sized intelligence down in the vault was killed in an interplanetary conflict. And sooner or later, Ronny, man in his explosion into the stars is going to run into either or both of the opponents in that conflict."

Ronny Bronston slumped back into his chair, his brain running out a dozen leads at once.

Metaxa and Jakes remained quiet, looking at him speculatively.

Ronny said slowly, "Then the purpose of Section G is to push the member planets of UP along the fastest path of progress, to get them

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ready for the eventual, inevitable meeting."

"Not just Section G," Metaxa growled, "but all of the United Planets organization, although most of the rank and file don't even know our basic purpose. Section G? We do the dirty work, and are proud to do it, by every method we can devise."

Ronny leaned forward. "But look," he said. "Why not simply inform all member planets of this common danger? They'd all unite in the effort to meet the common potential foe. Anything standing in the way would be brushed aside."

Metaxa shook his head wearily. "Would they? Is a common danger enough for man to change his institutions, particularly those pertaining to property, power and religion? History doesn't show it. Delve back into early times and you'll recall, for an example, that in man's early discovery of nuclear weapons he almost destroyed himself. Three or four different socio-economic systems co-existed at that time and all would have preferred destruction rather than changes in their social forms."

Jakes said, in an unwonted quiet tone, "No, until someone comes up with a better answer it looks as though Section G is going to have to continue the job of advancing man's institutions, in spite of himself."

The commissioner made it clearer. "It's not as though we deal with all our member planets. It isn't necessary. But you see, Ronny, the best colonists are usually made up of the, well, crackpot element. Those who are satisfied, stay at home. America, for instance, was settled by the adventurers, the malcontents, the nonconformists, the religious cultists, and even fugitives and criminals of Europe. So it is in the stars. A group of colonists go out with their dreams, their schemes, their far-out ideas. In a few centuries they've populated their new planet, and often do very well indeed. But often not and a nudge, a push, from Section G can start them up another rung or so of the ladder of social evolution. Most of them don't want the push. Few cultures, if any, realize they are mortal; like Hitler's Reich, they expect to last at least a thousand years. They resist any change—even change for the better."

Ronny's defenses were crumbling, but he threw one last punch. "How do you know the changes you make are for the better?"

Metaxa shrugged heavy shoulders. "It's sometimes difficult to decide, but we aim for changes that will mean an increased scientific progress, a more advanced industrial technology, more and better education, the opening of opportunity for every member of the culture to exert himself to the full of his abilities. The last is particularly important. Too many cultures, even those that think of themselves as particularly advanced, suppress the individual by one means or another."

Ronny was still mentally reeling with the magnitude of it all. "But how can you account for the fact that

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these alien intelligences haven't already come in contact with us?"

Metaxa shrugged again. "The Solar System, our sun, is way out in a sparcely populated spiral arm of our galaxy. Undoubtedly, these others are further in toward the center. We have no way of knowing how far away they are, or how many sun systems they dominate, or even how *many* other empires of intelligent life forms there are. All we know is that there are other intelligences in the galaxy, that they are near enough like us to live on the same type planets. The more opportunity man has to develop before the initial contact takes place, the stronger bargaining position, or military position, as the case may be, he'll be in."

Sid Jakes summed up the Tommy Paine business for Ronny's sake. "We need capable agents badly, but we need dedicated and efficient ones. We can't afford anything less. So when we come upon potential Section G operatives we send them out with a trusted Tog to get a picture of these United Planets of ours. It's the quickest method of indoctrination we've hit upon; the agent literally teaches himself by observation and participation. Usually, it takes four or five stops, on this planet and that, before the probationary agent begins sympathizing with the efforts of this elusive Tommy Paine. Especially since every Section G agent he runs into, including the Tog, of course, fills him full of stories of Tommy Paine's activities.

"You were one of the quickest to stumble on the true nature of our Section G. After calling at only three planets you saw that we ourselves are Tommy Paine."

"But . . . but what's the end?" Ronny said plaintively. "You say our job is advancing man, even in spite of himself when it comes to that. We start at the bottom of the evolutionary ladder in a condition of savagery, clan communism in government, simple animism in religion, and slowly we progress through barbarism to civilization, through paganism to the higher ethical codes, through chattle slavery and then feudalism and beyond. What is the final end, the Ultima Thule?"

Metaxa was shaking his head again. He poured himself another drink, offered the bottle this time to the others. "We don't know," he said wearily, "perhaps there is none. Perhaps there is always another rung on this evolutionary ladder." He punched at his order box and said, "Irene, have them do up a silver badge for Ronny."

Ronny Bronston took a deep breath and reached for the brown bottle. "Well," he said. "I suppose I'm ready to ask for my first assignment." He thought for a moment. "By the way, if there's any way of swing it, I wouldn't mind working with Supervisor Lee Chang Chu."

THE END

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IN TIMES TO COME

In our next issue, Clifford D. Simak starts his first novel in much too long a time—"The Fisherman."

Cliff Simak is basically a newspaperman; he's learned how to tell a story. He's also learned how people *do* react, rather than how they *should*, psychologically-sociologically-logically speaking, react. And he's learned how John Q. Public does in fact treat his Heroes. Like dirt, of course . . . once the Hero slips, even a little bit. Or even when the Hero hasn't, actually slipped at all, except in J. Q. Public's highly intransigent and egocentric opinion.

Ever think that, today, the cultural Hero isn't an individual, but a concept? Science . . . the public concept of Science—is strictly heroic, unrealistic, and overdrawn.

What happens if Science slips, just a little, in the public's opinion?

Nobody's so despised as the rejected Hero . . . even when he is, actually, doing a better job than was ever done before!

The Editor.

THE ANALYTICAL LABORATORY

The An Lab department our authors are acutely and personally interested in is the part concerning your votes. Maybe we should include special vote cards in each issue? How about expressing your opinions more freely on the stories? A postcard does fine—and the author who pleases you will be very pleased indeed—by the 1¢ or ½¢ a word bonus your votes bring him!

December, 1960 Issue

Place	Story	Author	Place
1.	The Longest Voyage	Poul Anderson	2.16
2.	The K-Factor	Harry Harrison	3.50
3.	Tied:		
	Man of Action	Donald E. Westlake	
	Occasion for Disaster (II)	Mark Phillips	3.66
4.	The Untouchable	Stephen A. Kallis, Jr.	4.00
5.	Gun for Hire	Mack Reynolds	4.33

The Editor.

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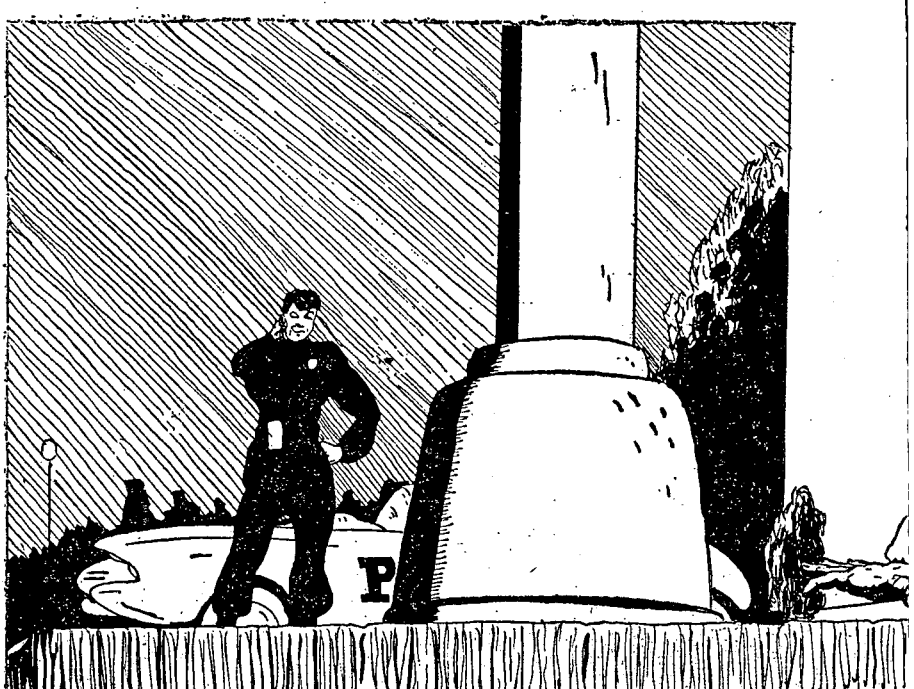
HORRIBLE EXAMPLE

By CLIFFORD D. SIMAK

There are certain rather delicate tasks which a robot might perform—tasks which, by their nature, no human being should be engaged in . . .

Illustrated by Douglas



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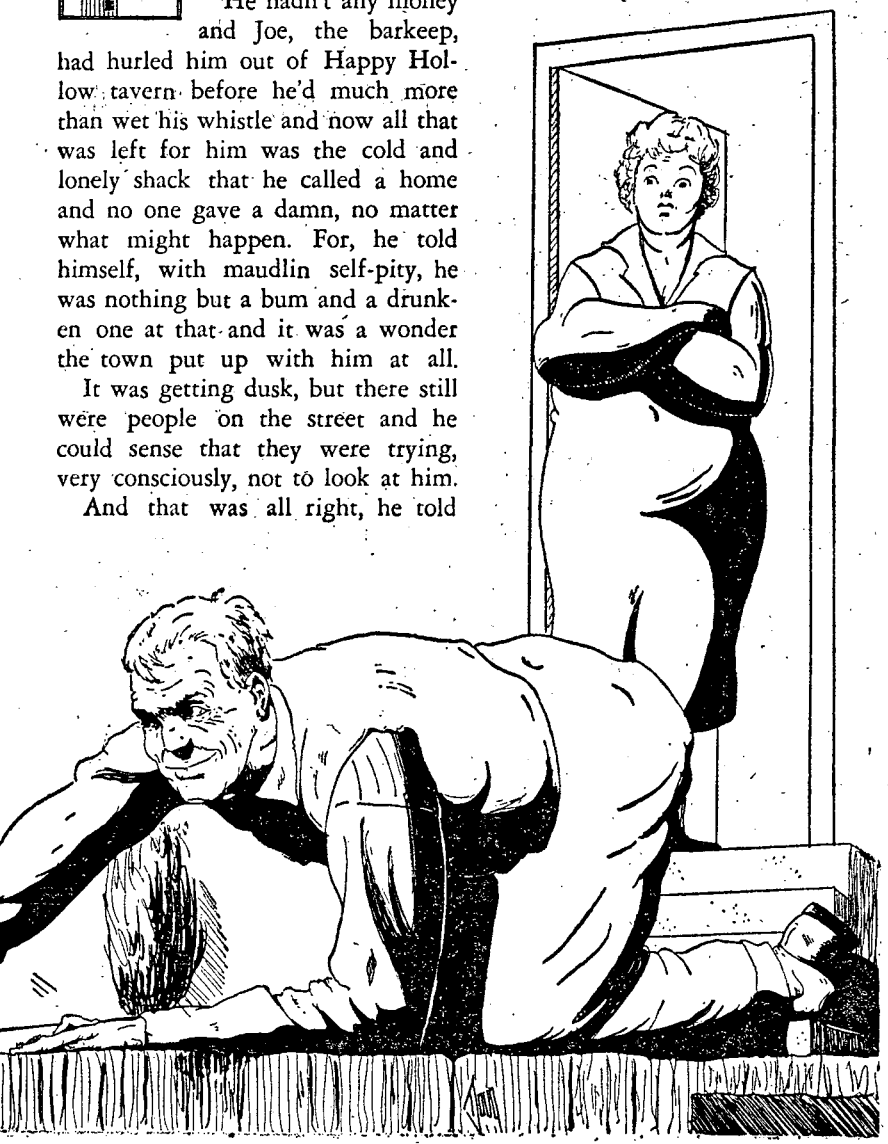
TOBIAS staggered down the street and thought how tough it was.

He hadn't any money and Joe, the barkeep, had hurled him out of Happy Hollow tavern before he'd much more than wet his whistle and now all that was left for him was the cold and lonely shack that he called a home and no one gave a damn, no matter what might happen. For, he told himself, with maudlin self-pity, he was nothing but a bum and a drunken one at that and it was a wonder the town put up with him at all.

It was getting dusk, but there still were people on the street and he could sense that they were trying, very consciously, not to look at him.

And that was all right, he told



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himself. If they didn't want to look, that was all right with him. They didn't have to look. If it helped them any, there was no reason they should look.

He was the town's disgrace. He was its people's social cross. He was their public shame. He was the horrible example. And he was unique, for there never was more than one of him in any little town—there simply wasn't room for more than one like him.

He reeled forlornly down the sidewalk and he saw that Elmer Clark, the village cop, was standing on the corner. Not doing anything. Just standing there and watching. But it was all right. Elmer was a good guy. Elmer knew exactly how it was.

Tobias stood for a moment to get his bearings and finally he had them; he set a dead sight for the corner where Elmer waited him. He navigated well. He finally reached the corner.

"Tobe," said Elmer, "maybe you should let me take you home. The car's just over there."

Tobias drew himself erect with fly-blown dignity.

"Couldn't think of it," he announced, every inch a gentleman. "Cannot let you do it. Very kindly of you."

Elmer grinned. "Take it easy, then. Sure that you can make it?"

"Poshitive," said Tobias, wobbling quickly off.

He did fairly well. He managed several blocks without incident.

But on the corner of Third and Maple, disaster overtook him. He fell flat upon his face and Mrs. Frobisher was standing on her porch where she could see him fall. Tomorrow, he was full aware, she would tell all the women at the Ladies Aid Society what a shameful thing it was. They all would quietly cluck among themselves, pursing up their mouths and feeling extra holy. For Mrs. Frobisher was their leader; she could do nothing wrong. Her husband was the banker and her son the star of Millville's football team, which was headed for the Conference championship. And that, without a doubt, was a thing of pride and wonder. It had been years since Millville High had won the Conference crown.

Tobias got up and dusted himself off, none too quietly and rather awkwardly, then managed to make his way to the corner of Third and Oak, where he sat down on the low stone wall that ran along the front of the Baptist church. The pastor, he knew, when he came from his basement study, would be sure to see him there. And it might do the pastor, he told himself, a world of good to see him. It might buck him up no end.

The pastor, he feared, was taking it too easy lately. Everything was going just a bit too smoothly and he might be getting smug, with his wife the president of the local DAR and his leggy daughter making such good progress with her music.

Tobias was sitting there and waiting for the pastor to come out when he heard the footsteps shuffling

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down the walk. It was fairly dark by now and it was not until the man got closer that he saw it was Andy Donovan, the janitor at the school.

Tobias chided himself a bit. He should have recognized the shuffle.

"Good evening, Andy," he said. "How are things tonight?"

Andy stopped and looked at him. Andy brushed his drooping mustache and spat upon the sidewalk so that if anyone were looking they'd be convinced of his disgust.

"If you're waiting for Mr. Halvorsen to come out," he said, "it's a dreadful waste of time. He is out of town."

"I didn't know," Tobias said, contritely.

"You've done quite enough tonight," said Andy, tartly. "You might just as well go home. Mrs. Frobisher stopped me as I was going past. She said we simply have to do something firm about you."

"Mrs. Frobisher," said Tobias, staggering to his feet, "is an old busybody."

"She's all of that," said Andy. "She's likewise a decent woman."

He scraped around abruptly and went shuffling down the street, moving, it seemed, a trifle more rapidly than was his usual pace.

Tobias wobbled solemnly down the street behind him, with the wobble somewhat less pronounced, and he felt the bitterness and the question grow inside of him.

For it was unfair.

Unfair that he should be as he was when he could just as well be something else entirely—when the whole conglomerate of emotion and desire that spelled the total of himself cried out for something else.

He should not, he told himself, be compelled to be the conscience of this town. He was made for better things, he assured himself, hiccuping solemnly.

The houses became more scattered and infrequent and the sidewalk ended and he went stumbling down the unpaved road, heading for his shack at the edge of town.

His shack stood on a hill set above a swamp just beyond the intersection of this road on which he walked with Highway 49 and it was a friendly place to live, he thought. Often he just sat outside and watched the cars stream past.

But there was no traffic now and the moon was coming up above a distant copse and its light was turning the countryside to a black and silver etching.

He went down the road, his feet plopping in the dust and every now and then something set a bird to twitter and there was the smell of burning autumn leaves.

It was beautiful, Tobias thought—beautiful and lonely. But what the hell, he thought, he was always lonely.

Far off he heard the sound of the car, running hard and fast, and he grumbled to himself at how some people drove.

He went stumbling down the dusty stretch and now, some dis-

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tance to the east, he saw the headlights of the car, traveling rapidly.

He watched it as he walked and as it neared the intersection there was a squeal of brakes and the headlights swung toward him as the car made a sudden turn into his road.

Then the headlight beams knifed into the sky and swept across it in a rapid arc and he caught the flash of glowing taillight as the car skidded with the scream of rubber grinding into pavement.

Slowly, almost ponderously, the car was going over, toppling as it plunged toward the ditch.

Tobias found that he was running, legs pumping desperately and no wobble in them now.

Ahead of him the car hit on its side and skidded with a shrill, harsh grinding, then nosed easily, almost deliberately down into the roadside ditch. He heard the gentle splash of water as it slid to a halt and hung there, canted on its side, with its wheels still spinning.

He leaped from the road down onto the side of the car that lay uppermost and wrenched savagely at the door, using both his hands. But the door was a stubborn thing that creaked and groaned, but still refused to stir. He braced himself as best he could and yanked; it came open by an inch or so. He bent and got his fingers hooked beneath the door edge and even as he did he smelled the acrid odor of burning insulation and he knew the time was short. He became aware as well of the trapped and frightened desperation underneath the door.

A pair of hands from inside was helping with the door and he slowly straightened, pulling with every ounce of strength he had within his body and the door came open, but protestingly.

There were sounds now from inside the car, a soft, insistent whimpering, and the smell of burning sharper, and he caught the flare of flame running underneath the hood.

Something snapped and the door came upward, then stuck tight again, but now there was room enough and Tobias reached down into the opening and found an arm and hauled. A man came out.

"She's still in there," gasped the man. "She's still—"

But already Tobias was reaching down blindly into the darkness of the car's interior and now there was smoke as well as smell and the area beneath the hood was a gushing redness.

He found something alive and soft and struggling and somehow got a hold on it and hauled. A girl came out; a limp, bedraggled thing she was and scared out of her wits.

"Get out of here!" Tobias yelled and pushed the man so that he tumbled off the car and scrambled up the ditchside until he reached the road.

Tobias jumped, half carrying, half dragging the girl, and behind him the car went up in a gush of flame.

They staggered up the road, the three of them, driven by the heat of the burning car. Somewhere, some-

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how, the man got the girl out of Tobias' grasp and stood her on her feet. She seemed to be all right except for the trickle of darkness that ran out of her hairline, down across her face.

There were people running down the road now. Doors were banging far away and there was shouting back and forth, while the three of them stood in the road and waited, all of them just a little dazed.

And now, for the first time, Tobias saw the faces of those other two. The man, he saw, was Randy Frobisher, Millville's football hero, and the girl was Betty Halvorsen, the musical daughter of the Baptist minister.

Those who were running down the road were getting close by now and the pillar of flame from the burning car was dying down a bit. There was no further need, Tobias told himself, for him to stick around. For it had been a great mistake, he told himself; he never should have done it.

He abruptly turned around and went humping down the road, as rapidly as he could manage short of actual running. He thought he heard one of the two standing in the road call out after him, but he paid them no attention and kept on moving, getting out of there as fast as he was able.

He reached the intersection and crossed it and left the road and went up the path to where his shack perched in all its loneliness on the hill above the swamp.

And he forgot to stagger.

But it didn't matter now, for there was no one watching.

He felt all cold and shivery and there was a sense of panic in him. For this might spoil everything; this might jeopardize his job.

There was a whiteness sticking out of the rusty, battered mail box nailed beside the door and he stared at it with wonder, for it was very seldom that he got a piece of mail.

He took the letter from the box and went inside. He found the lamp and lit it and sat down in the rickety chair beside the table in the center of the room.

And now his time was his, he thought, to do with as he wished.

He was off the job—although, technically, that was not entirely true, for he was never off the job entirely.

He rose and took off his tattered jacket and hung it on the chair back, then opened up his shirt to reveal a hairless chest. He sought the panel in his chest and pushed against it and it slid open underneath his hand. At the sink, he took out the container and emptied the beer that he had swallowed. Then he put the container back into his chest again and slid the panel shut. He buttoned up his shirt.

He let his breathing die.

He became comfortably himself.

He sat quietly in the chair and let his brain run down, wiping out his day. Then, slowly, he started up his brain again and made it a different kind of brain—a brain oriented to

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this private life of his, when he no longer was a drunken bum or a village conscience or a horrible example.

But tonight the day failed to be wiped out entirely and there was bitterness again—the old and acid bitterness that he should be used to protect the humans in the village against their human viciousness.

For there could be no more than one human derelict in any single village—through some strange social law there was never room for more than one of them. Old Bill or Old Charlie or Old Tobe—the pity of the people, regarded with a mingled sentiment of tolerance and disgust. And just as surely as there could not be more than one of them, there always was that one.

But take a robot, a Class One humanoid robot that under ordinary scrutiny would pass as a human being—take that robot and make him the village bum or the village idiot and you beat that social law. And it was perfectly all right for a manlike robot to be the village bum. Because in making him the bum, you spared the village a truly human bum, you spared the human race one blot against itself, you forced that potential human bum, edged out by the robot, to be acceptable. Not too good a citizen, perhaps, but at least marginally respectable.

To be a drunken bum was terrible for a human, but it was all right for a robot. Because robots had no souls. Robots didn't count.

And the most horrible thing about it, Tobias told himself, was that you must stay in character—you must not step out of it except for that little moment, such as now, when you were absolutely sure no one could be watching.

But he'd stepped out of it this night. For a few isolated moments he'd been forced to step out of it. With two human lives at stake, there had been no choice.

Although, he told himself, there might be little harm. The two kids had been so shaken up that there was a chance they'd not known who he was. In the shock of the moment, he might have gone unrecognized.

But the terrible thing about it, he admitted to himself, was that he yearned for that recognition. For there was within himself a certain humanness that called for recognition, for any recognition, for anything at all that would lift him above the drunken bum.

And that was unworthy of himself, he scolded—unworthy of the tradition of the robot.

He forced himself to sit quietly in the chair, not breathing, not doing anything but thinking—being honest with himself, being what he was, not play-acting any more.

It would not be so bad, he thought, if it was all that he was good for—if, in being Millville's horrible example he was working at the limit of his talent.

That, he realized, had been true at one time. It had been true when he'd signed the contract for the job.

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But it was true no longer. He was ready now for a bigger job.

For he had grown, in that subtle, inexplicable, curious way that robots grew.

And it wasn't right that he should be stuck with this job when there were other, bigger jobs that he could handle easily.

But there was no remedy. There was no way out of it. There was no one he could go to. There was no way he could quit.

For in order to be effective in this job of his, it was basic that no one—no one, except a single contact, who in turn must keep the secret—know he was a robot. He must be accepted as a human. For if it should be known that he was not a human, then the effectiveness of his work would collapse entirely. As a drunken human bum he was a shield held between the town and petty vulgar vice; as a drunken, lousy, no-good robot he would not count at all.

So no one knew, not even the village council which paid the annual fee, grumblingly, perhaps, to the Society for the Advancement and Betterment of the Human Race, not knowing for what specific purpose it might pay the fee, but fearful not to pay it. For it was not every municipality that was offered the unique and distinctive service of SABHR. Once the fee should be refused, it might be a long, long time before Millville could get on the list again.

So here he sat, he thought, with a contract to this town which would run another decade—a contract of which the town knew nothing, but binding just the same.

There was no recourse, he realized. There was no one he could go to. There was none he could explain to, for once he had explained he'd have wiped out his total sum of service, he would have cheaply tricked the town. And that was something no robot could ever bring himself to do. It would not be the proper thing.

He tried to find within himself some logic for this consuming passion to do the proper thing, for the bond of honor involved within a contract. But there was no clear-cut logic; it was just the way it was. It was the robot way, one of the many conditioning factors which went into a robot's makeup.

So there was no way out of it. He faced another decade of carrying out the contract, of getting drunk, of stumbling down the street, of acting out the besotted, ambitionless, degraded human being—and all to the end that there should be no such actual human.

And being all of this, he thought, choked with bitterness, while knowing he was fit for better things, fit under his present rating for sociological engineering at the supervisor level.

He put out his arm and leaned it on the table and heard the rustle underneath his arm.

The letter. He'd forgotten it.

He picked up the envelope and looked at it and there was no return address and he was fairly certain who it might be from.

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He tore it open and took out the folded sheet of paper and he had been right. The letterhead was that of the Society for the Advancement and Betterment of the Human Race.

The letter read:

Dear Associate:

You will be glad to know that your recent rating has been analyzed and that the final computation shows you to be best fitted as a co-ordinator and expediter with a beginning human colony. We feel that you have a great deal to offer in this type of employment and would be able to place you immediately if there were no other consideration.

But we know that you are under a contractual obligation and perhaps do not feel free to consider other employment at the moment.

If there should be a change in this situation, please let us know at once.

The letter was signed with an undecipherable scrawl.

Carefully, he folded the sheet and stuffed it in his pocket.

He could see it now: Out to another planet that claimed another star for sun, helping to establish a human colony, working with the colonists, not as a robot—for in sociology, one never was a robot—but as another human being, a normal human being, a member of the colony.

It would be a brand-new job and a brand-new group of people and a brand-new situation.

And it would be a straight role. No more comedy, no more tragedy. No more clowning, ever.

He got up and paced the floor.

It wasn't right, he told himself. He shouldn't waste another ten years here. He owed this village nothing—nothing but his contract, a sacred obligation. Sacred to a robot.

And here he was, tied to this tiny dot upon the map, when he might go among the stars, when he might play a part in planting among those stars the roots of human culture.

It would not be a large group that would be going out. There was no longer any massive colonizing being done. It had been tried in the early days and failed. Now the groups were small and closely tied together by common interests and old associations.

It was more, he told himself, like homesteading than colonizing. Groups from home communities went out to try their luck, even little villages sending out their bands as in the ancient past the eastern communities had sent their wagon trains into the virgin west.

And he could be in on this great adventure if he could only break his contract, if he could walk out on this village, if he could quit this petty job.

But he couldn't. There was nothing he could do. He'd reached the bare and bitter end of ultimate frustration.

There was a knocking on the door and he stopped his pacing, stricken, for it had been years since there'd been a knock upon the door. A

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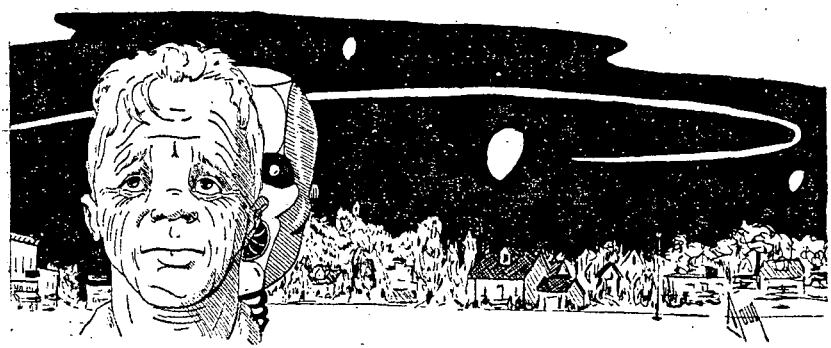
knock upon the door, he told himself, could mean nothing else but trouble. It could only mean that he'd been recognized back there on the road—just when he'd been beginning to believe that he'd gone unrecognized.

He went slowly to the door and opened it and there stood the four of them—the village banker, Herman Frobisher; Mrs. Halvorsen, the wife of the Baptist minister; Bud Anderson, the football coach, and Chris Lambert, the editor of the weekly paper.

And he knew by the looks of them



that the trouble would be big—that here was something he could not brush lightly to one side. They had a dedicated and an earnest look about them—and as well the baffled look of people who had been very wrong and had made up their minds most resolutely to do what they could about it.

Herman held out his pudgy hand with a friendly forcefulness so overdone it was ridiculous.

"Tobe," he said, "I don't know how to thank you, I don't have the words to thank you for what you did tonight."

Tobias took his hand and gave it a quick clasp, then tried to let go of it, but the banker's hand held on almost tearfully.

"And running off," shrilled Mrs. Halvorsen, "without waiting to take any credit for how wonderful you were. I can't, for the life of me, know what got into you."

"Oh," Tobias said uncomfortably, "it really wasn't nothing."

The banker let go of Tobias' hand and the coach grabbed hold of it, almost as if he had been waiting for the chance to do so.

"Randy will be all right, thanks to you," he said. "I don't know what we'd have done without him, Tobe, in the game tomorrow night."

"I'll want a picture of you, Tobe," said the editor. "Have you got a picture? No, I suppose you haven't. We'll take one tomorrow."

"But first," the banker said, "we'll get you out of here."

"Out of here?" asked Tobias, real-

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ly frightened now. "But, Mr. Frobisher, this place is my home!"

"Not any more, it isn't," shrilled Mrs. Halvorsen. "We're going to see that you get the chance that you never had. We're going to talk to AA about you."

"AA?" Tobias asked in a burst of desperation.

"Alcoholics Anonymous," the pastor's wife said primly. "They will help you stop your drinking."

"But suppose," the editor suggested, "that Tobe here doesn't want to."

Mrs. Halvorsen clicked her teeth, exasperated. "Of course he does," she said. "There never was a man—"

"Now, now," said Herman, "I think we may be going just a bit too fast. We'll talk to Tobe tomorrow—"

"Yeah," said Tobias, reaching for the door, "talk to me tomorrow."

"No, you don't," said Herman. "You're coming home with me. The wife's got a supper waiting and we have a room for you and you can stay with us until we get this straightened out."

"I don't see," protested Tobias, "there's much to straighten out."

"But there is," said Mrs. Halvorsen. "This town has never done a thing for you. We've all stood calmly by and watched you stagger past. And it isn't right. I'll talk to Mr. Halvorsen about it."

The banker put a companionable arm around Tobias' shoulder.

"Come on, Tobe," he said. "We never can repay you, but we'll do the best we can."

He lay in bed, with a crisp white sheet beneath him and a crisp white sheet on top and now he had the job, when everyone was asleep, of sneaking to the bathroom and flushing all the food they'd insisted he should eat down the toilet bowl.

And he didn't need white sheets. He didn't need a bed. He had one in his shack, but it was just for the looks of things. But here he had to lie between white sheets and Herman even had insisted that he take a bath and he had needed one, all right, but it had been quite a shock.

His whole life was all loused up, he told himself. His job was down the drain. He'd failed, he thought, and failed most miserably. And now he'd never get a chance to go on a colonizing venture—even after his present job was all wrapped up and done, he'd never have a chance at a really good job. He'd just get another piddling one and he'd spend another twenty years at it and he'd maybe fail in that one, too—for if you had a weakness, it would seek you out.

And he had a weakness. Tonight he'd found it out.

But what should he have done, he asked himself. Should he have hurried past and leave the kids to die inside the flaming car?

He lay between the clean white sheets and looked at the clean, white moonlight streaming through the window and asked himself the question for which there was no answer.

Although there was a hope and he thought about the hope and it be-

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came a brighter hope and he felt a good deal better.

He could beat this thing, he told himself—all he had to do was get drunk again, or pretend to get drunk again, for he was never really drunk. He could go on a binge that would be an epic in the history of the village. He could irretrievably disgrace himself. He could publicly and willfully throw away the chance that had been offered him to become a decent citizen. He could slap the good intentions of all these worthy people right smack in the puss and he'd become, because of that, a bigger stinker than he'd ever been before.

He lay there and thought about it. It was a good idea and he would have to do it—but perhaps not right away.

It might look a little better if he waited for a while. It might have more effect if he played at being decent for a week or so. Then when he fell out of grace, the shock might be the greater. Let them wallow for awhile in all the holiness of feeling that they had rescued him from a vicious life, let them build up hope before he, laughing in their faces, staggered back to the shack above the swamp.

And when he did that it would be all right. He'd be back on the job again, better than before.

A week or two, perhaps. Or maybe more than that.

And suddenly he knew. He fought against the knowing, but it stood out plain and clear.

He wasn't being honest.

He didn't want to go back to the person he had been.

This was what he'd wanted, he admitted to himself. It was something he had wanted for a long time now—to live in the respect of his fellow villagers, to win some acceptance from them, to win contentment with himself.

Henry had talked after supper about a job for him—an honest, steady job. And lying there, he knew that he yearned to have that job, to become in all reality a humble, worthy citizen of Millville.

But it was impossible and he knew it was and the entire situation was worse than ever now. For he was no longer a simple fumbler, but a traitor, self-confessed.

It was ironical, he told himself, that in failure he should find his heart's desire, a fulfillment he could not consider keeping.

If he'd been a man, he'd have wept.

But he couldn't weep. He lay cold and rigid in the crisp white bed with the crisp white moonlight pouring through the window.

He needed help. For the first time in his life, he was in need of friendly help.

There was one place that he could go, one place of last resort.

Moving softly, he got into his clothes and eased out of the door and went on tiptoe down the stairs.

A block from the house he figured that it was safe to run and he ran in

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slobbering haste, with the wild horsemen of fear running at his heels.

Tomorrow was the game—the big game that Randy Frobisher was still alive to play in—and Andy Donovan would work late tonight so that he'd have time off from his janitoring to take in the game.

He wondered what the time was and he knew it must be late. But, he told himself, Andy must still be there at his chores of janitoring—he simply must be there.

He reached the school and ran up the curving walk toward the building, looming in all its massive darkness. He wondered, with a sinking feeling, if he had come in vain, if he'd run all this way for nothing.

Then he saw the dim light shining in one of the basement windows—down in the storage room—and he knew it was all right.

The door was locked and he raised a fist and hammered on it, then waited for a while, then hammered once again.

Finally he heard the shuffling footsteps come scuffing up the stairs and a moment later saw the wavering of a shadow just beyond the door.

There was a fumbling of the keys and the snicking of the lock and the door came open.

A hand reached out and dragged him quickly in. The door sighed to behind him.

"Tobe!" cried Andy Donovan. "I am glad you came."

"Andy, I made a mess of it!"

"Yes," Andy said, impatiently. "Yes, I know you did."

"I couldn't let them die. I couldn't stand there and do nothing for them. It wouldn't have been human."

"It would have been all right," said Andy. "For you aren't human."

He led the way down the stairs, clinging to the rail and shuffling warily.

And all around them, silence echoing in emptiness, Tobias sensed the eerie terror of a school waiting through the night.

They turned right at the foot of the stairs into the storage room.

The janitor sat down on an empty crate and waved the robot to another.

Tobias did not sit immediately. He had quick amends to make.

"Andy," he said, "I've got it figured out. I'll go on the biggest drunk—"

Andy shook his head, "It would do no good," he said. "You have shown a spark of goodness, a certain sense of greatness. Remembering what you've done, they'd make excuses for you. They'd say there was some good in you, no matter what you did. You couldn't do enough, you couldn't be big enough a louse for them ever to forget."

"Then," said Tobias, and it was half a question.

"You are all washed up," said Andy. "You are useless here."

He sat silently for a moment, staring at the stricken robot.

"You've done a good job here," Andy finally said. "It's time that someone told you. You've been con-

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scientious and unsparing of yourself. You've had a fine influence on the town. No one else could have forced himself to be so low-down and despicable and disgusting—"

"Andy," said Tobias bitterly, "don't go pinning medals on me."

"I wish," said the janitor, "you wouldn't feel like that."

Out of the bitterness, Tobias felt a snicker—a very ghastly snicker—rising in his brain.

And the snicker kept on growing—a snicker at this village if it could only know that it was being engineered by two nondescripts, by a shuffling janitor and a filthy bum.

And with him, Tobias, robot, it probably didn't matter, but the human factor would. Not the banker, nor the merchant, nor the pastor, but the janitor—the cleaner of the windows, the mopper of the floors, the tender of the fires. To him had been assigned the keeping of the secret; it was he who had been appointed the engineering contact. Of all the humans in the village, he was the most important.

But the villagers would never know, neither their debt nor their humiliation. They'd patronize the janitor. They'd tolerate the bum—or whatever might succeed the bum.

For there'd be a bum no longer. He was all washed up. Andy Donovan had said so.

And they were not alone. He could sense they weren't.

He spun swiftly on his heel and there stood another man.

He was young and polished and most efficient-looking. His hair was black and smooth and he had an eager look about him that made one ill at ease.

"Your replacement," said Andy, chuckling just a little. "This one, let me tell you, is a really dirty trick."

"But he doesn't look—"

"Don't let his appearance fool you," Andy warned. "He is worse than you are. He's the latest gimmick. He is the dirtiest of all. They'll despise him more than they ever despised you. He'll earn an honest hatred that will raise the moral tone of Millville to a degree as yet undreamed of. They'll work so hard to be unlike him that we'll make honest men out of every one of them—even Frobisher."

"I don't understand," Tobias told him weakly.

"He'll set up an office, a very proper office for an alert young business man. Insurance and real estate and property management and anything else where he can earn a dollar. He'll skin them blind, but legal. He'll be very sanctimonious, but there's no friendship in him. He'll gyp them one by one and he'll smile most prettily and sincerely while he robs them by the letter of the law. There'll be no trick so low he'll not employ it, no subterfuge so vile that he'll hesitate to use it."

"But it's unfair!" Tobias cried. "At least I was an honest bum."

"We must," Andy told him unctuously, "act for the good of all humanity. Surely it would be a shame

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for Millville to ever have an actual human such as he."

"All right, then," Tobias said. "I wash my hands of it. How about myself?"

"Why, nothing at the moment," Andy told him. "You go back to Herman's place and let nature take its course. Take the job he hunts up for you and be a decent citizen."

Tobias got cold all over. "You mean you're ditching me entirely? You mean you have no further use for me at all? I only did my best. There was nothing else I could have done tonight. You can't just throw me out!"

Andy shook his head. "There's something I should tell you. It's just a little early to be saying anything—but there's quiet talk in the village of sending out a colony."

Tobias stood stiff and straight and hope went pounding through him, then the hope died out.

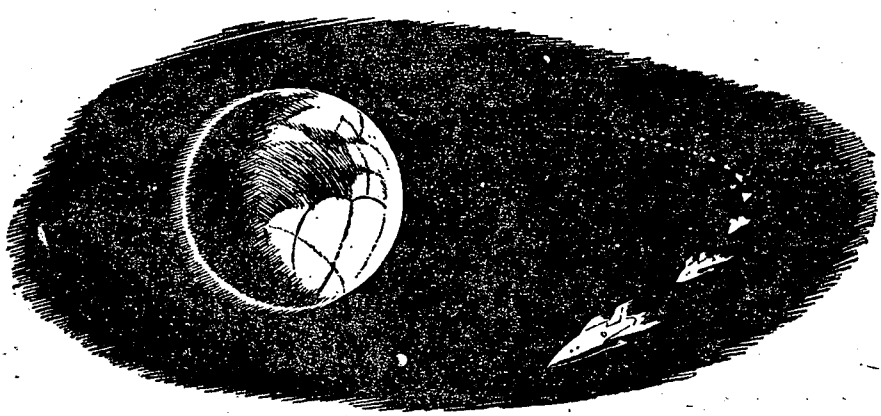
"But me," he said. "Not me. Not a bum like me!"

"Worse than a bum," said Andy. "Much worse than a bum. As a bum you were a known quantity. They knew what to expect from you. They could sit down at any time and plot a behavior curve for you. As a reformed bum, you'll be something else again. You'll be unpredictable. They'll be watching you, wondering what will happen next. You'll make them nervous and uneasy. They'll be wondering all the time if what they did was right. You'll be a burden on their conscience and a rasp across their nerves and they'll be afraid that you'll somehow prove some day that they were awfully stupid."

"Feeling that way," Tobias said, with no final shred of hope, "they'd never let me go out to the colony."

"I think you're wrong," said Andy. "I am sure that you will go. The good and nervous people of this village couldn't pass up a chance like that of getting rid of you."

THE END



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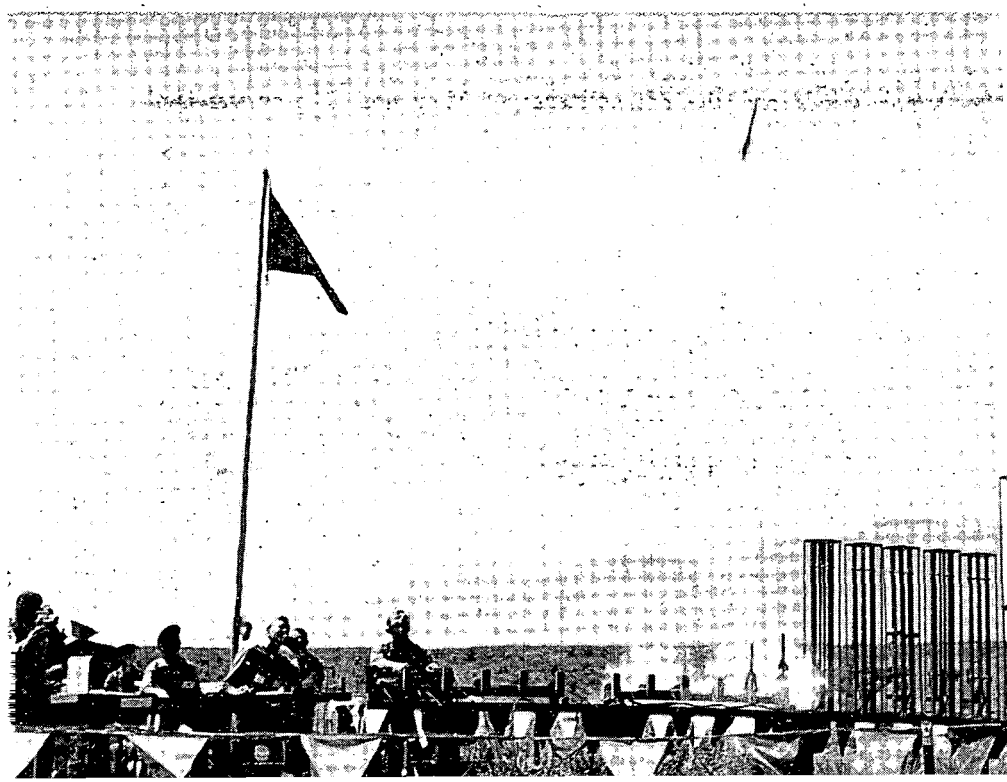
SUB-MACH ROCKETS

All photographs by author.

BY G. HARRY STINE

Working with scale models runs into certain slight difficulties—the Scale Effect problem. Most of nature's laws are NOT linear, so that half the size doesn't reduce the forces by a nice, neat one half. And most specifically, the behavior of air changes drastically between Mach 1.0 and Mach 0.5 for instance.

"Blast off!" Scooting aloft from its launcher during the Second Annual Model Rocket Championships, a little model rocket reaches for the blue. Because of limited power and low speeds, model rocketeers have had to develop entirely new low-drag shapes for their models.



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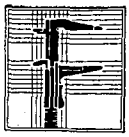

FOR THE past twenty years, there has been an increasing amount of research and study devoted to highspeed flight at supersonic and hypersonic speeds . . . and practically no work at all in the very low-speed flight regime. Engineers have learned how to build airplanes that will cruise at Mach 3 and rockets that will fly at Mach 25.

And the same engineering types are having a deuce of a time building an airplane that will take off on short fields or even take off and land vertically.

This entire field of low-speed aerodynamics has been very sadly neglected throughout the history of flight. The trends and the advancements have always been to achieve higher speeds and higher altitudes. The professional aeronautical scientists have ignored the field of low-speed flight, possibly because they felt it held few, if any, rewards.

As a result, the greatest percentage of research in low-speed flight has been done by amateurs.

Some of the finest work in low-speed flight was done by W. C. Brown and a group of amateurs in Boston in 1941. They constructed a low-speed wind tunnel and plotted the curves for a series of simple airfoils for airspeeds of 15-40 miles per hour. After the war, the Department of Aerophysics at Mississippi State University did additional work in this speed range. This, plus work by Storer in bird flight and some European work reported by Hoerner, is nearly all the data available. Some of it has been used extensively by thousands of modern amateurs interested in low-speed flight, the model airplane enthusiasts.

Lately, a new group of hobbyists has had occasion to become very interested in sub-mach flight: the model rocketeers.

Being a rather ardent model rocketeer myself, I naturally became extremely interested in the subject. This caused me to do some research in the library and on model rocket ranges.

It was no surprise to discover that nobody—*nobody*—had done any research on low-speed ballistic flight. We may define ballistic flight as flight without wings; rocket flight, if you please.

Why not? The answer is simple. The first rocket-powered guided missiles developed after World War II flew at very high subsonic speeds—Mach 0.9. Within a few years, guided missiles flew at supersonic speeds; they were designed to fly only at supersonic speeds; and everyone quietly forgot about subsonic rockets. Most ballistic rockets spent the majority of their flight in supersonic flight, too.

Until the model rocket came along.

A model rocket is a very small edition of a real rocket. It is very light, usually weighing less than three ounces, and is made from paper, balsa wood, and plastic. For power it uses small, commercially-made model rocket engines with thrusts of about a pound and durations up to two seconds. It is very small, usually less than

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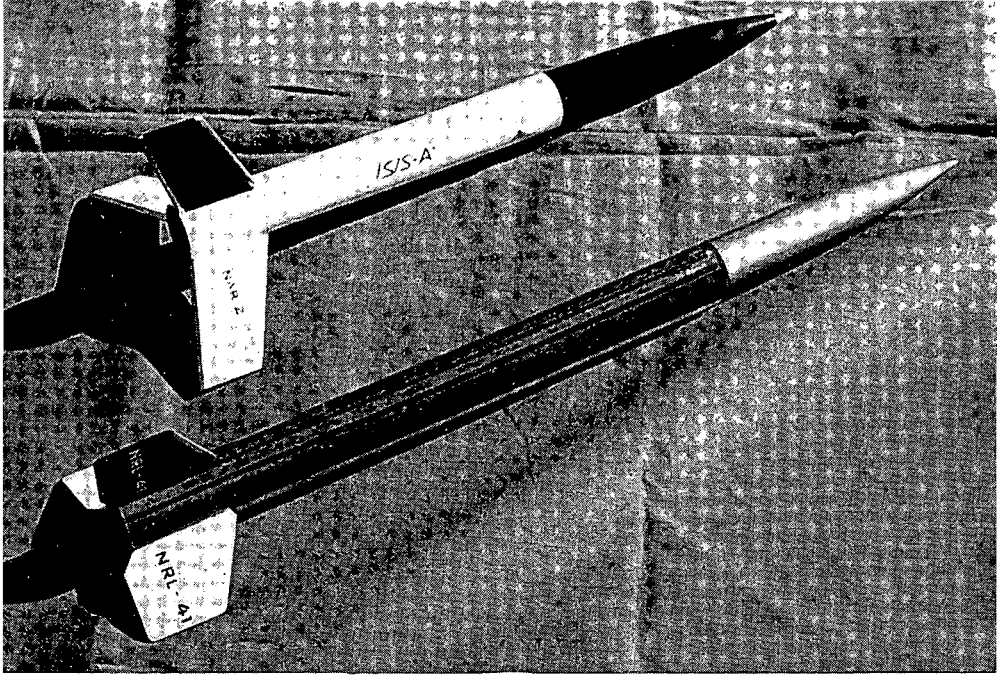

The basic "Aerobee-Hi" scale model rocket kit (bottom) was the forerunner of a whole series of model rocket designs based on the Aerobee-Hi's configuration. Such a derived design, the "Isis-A" (above) shows how strongly this influence was felt during the early years of model rocketry. Unfortunately the basic design was wrong for the speed regime of model rockets.

fifteen inches in length and one inch in diameter.

Model rockets, even the staged varieties, rarely exceed two hundred feet per second velocity. That is approximately Mach 0.182 at sea level standard conditions. They are fin-stabilized, which means that they must gain all their stability in flight from aerodynamic fin moments. With their limited power, it is absolutely essential that they have extremely low drag if they are to achieve any sort of decent performance. In addition, their fins must provide them with excellent stability at very low speeds; model rockets are launched from three-foot rails or towers, and they become airborne at airspeeds of 20-30 miles per hour.

Because of these factors, it took us a long time to learn how to build proper model rockets. The "we" in this case includes about five hundred ardent model rocketeers of the National Association of Rocketry. We began by designing model rockets as scaled-down versions of big, fin-stabilized sounding rockets such as the Aerobee, the Asp, the Arcon, the Viking, and others. We got them to fly,

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Right-hand model is a scale model of the "Pogo-Hi" target rocket, the prototype of which flies at supersonic speeds. The nose cone is sharply-pointed and the fins have sharply-angled supersonic airfoils. Left-hand model, "Gizmo-E" does not look as streamlined with its parabolic nose shape and airfoiled fins. Yet the Gizmo-E will not only outfly the Pogo-Hi model, but will do so while carrying a one-ounce NAR lead payload, too! In fact, the Gizmo-E holds the NAR national model rocket record for Class B Payload models; powered by a model rocket engine of one pound-second total impulse, it carried its payload to 637 feet.

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and we learned something about stability from them. Even the free-lance designs, original ones, resembled the "big ones." They had sharply-pointed noses, sharply swept fins of supersonic design, and supersonic fin airfoils with pointed leading edges. They looked like the big ones, because after all that was the way a rocket was supposed to look, wasn't it?

Early in 1960, it suddenly occurred to several people, including myself, that we had taken an entirely wrong approach to the design of our models.

We were designing them with supersonic airframes when they were not to fly above Mach 0.2!

At low subsonic speeds, air flow is quite different from supersonic air flow. At low speeds, air acts like an incompressible fluid that is very sticky and viscous. It flows around an object like water. It even "wets" the surface with a very low speed boundary layer that creates drag. A subsonic airborne shape must be designed so that the air flows around it without creating turbulence or separation of the boundary layer, because this increases drag by several hundred per cent when it happens.

Aerodynamics is not an exact science. In fact, some people maintain it is not a science at all, but an arcane art. After tangling horns with aerodynamics, I can well understand this sentiment. Aerodynamics is based upon empirical data obtained by Experimentation. In spite of the efforts of such men as Bernoulli, Mach, Prandtl, Reynolds, and others, aerodynamics still remains an empirical engineering art. Engineers design an airplane, then subject it to wind-tunnel testing to see if it might fly. They discover design errors, and correct them by cut-and-try methods.

The first prototype airplane may get off the ground without much trouble, but it may not perform as expected or as required in the air. It may be slightly unstable. It may not fly as fast or as far as expected. Put it into "dirty" condition with flaps and gear down, and it may fall out of the air. It may have a tendency to snap-stall, buffet in stalls, or fall off into tight spins. Name any airplane, and it is the same story.

Watch a supersonic fighter take off, and you will see a small tab on the rudder wiggling wildly back and forth; that is the yaw damper, an automatic gadget that keeps the plane from trying to fly sideways the way it wants to. Check a Boeing 707, one of the first jet transports; you will find (a) a Mach control that keeps the nose from tucking under at high subsonic speeds, (b) a flat slat inboard of the outer engine on the wing which extends at low speeds to keep the ship from buffeting and stalling, and (c) a series of vanelike "vortex generators" along the upper surface of the wing to "straighten out airflow at high speeds and make the plane fly faster."

These aircraft are truly miracles of design. However, if we really understood aerodynamics and if it were really a true science, we would know enough to eliminate the need for such after-thoughts as vortex generators

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and yaw dampers by designing the flying machine properly in the first place.

Knowing that aerodynamics is an arcane art and that in all probability nobody knew anything more about the low-speed end of it than we did at the moment, we started fresh. Our question was: What is the optimum shape for a low-speed ballistic vehicle? Additional questions were: What shapes will contribute to designs of minimum drag, and which shapes will provide the maximum degree of stability at the critical instant when the model leaves the launcher and starts off on its own?

Luckily, we had some wind-tunnel data taken in a small tunnel with an Aerobee-Hi model and an airspeed of seventy-three feet per second. We looked at that data and compared it to the drag curves of the real Aerobee-Hi. Even compensating for Reynolds Number, the drag of the Aerobee-Hi model at low speeds was several hundred per cent higher than its big brother at supersonic speeds. We had no data on low airspeeds for the Aerobee-Hi sounding rocket itself. But now we had basic two component data on a model rocket. We could use it as a standard and, not having a wind tunnel of our own, use Nature's outdoor wind tunnel on a model rocket range. We could compare the altitude achieved by an Aerobee-Hi model against that achieved by any other design and then compute the drag of the new design.

We became interested in low-drag shapes for the model itself and high-lift airfoils and fin platforms for the fins. In addition, we had to think about boundary layer conditions because of the extremely low Reynolds Number of model rockets. Reynolds Number, for those uninitiated in the sorcery of fluid dynamics, is something like a scaling factor for fluid flow. It is derived from the length of the object and the speed of the object through a fluid medium; the viscosity of the fluid medium is also an important factor.

In comparison to large rockets, our models had very low Reynolds Numbers and were, scale-wise, flying in much more viscous air. This meant that drag-producing turbulence could be generated in the boundary layer of a model rocket with great ease. Model rockets would *really* have to be streamlined!

To date, we have part of the answers, but not all of them. Model rockets are now being designed to fly in the aerodynamic regime of their low veolcity. At first glance, they don't look very streamlined at all, and

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Which flies faster and higher? The model with its pointed nose and wedge fin airfoils was derived from a design study of a Mach-4 weather rocket. Right-hand model is a redesign of the basic airframe based on incompressible subsonic flow, since it will not exceed Mach-0.2 in flight as a model. The Python-2 with the same weight as Python-Ib will reach the same altitude as the latter with one half the total impulse.

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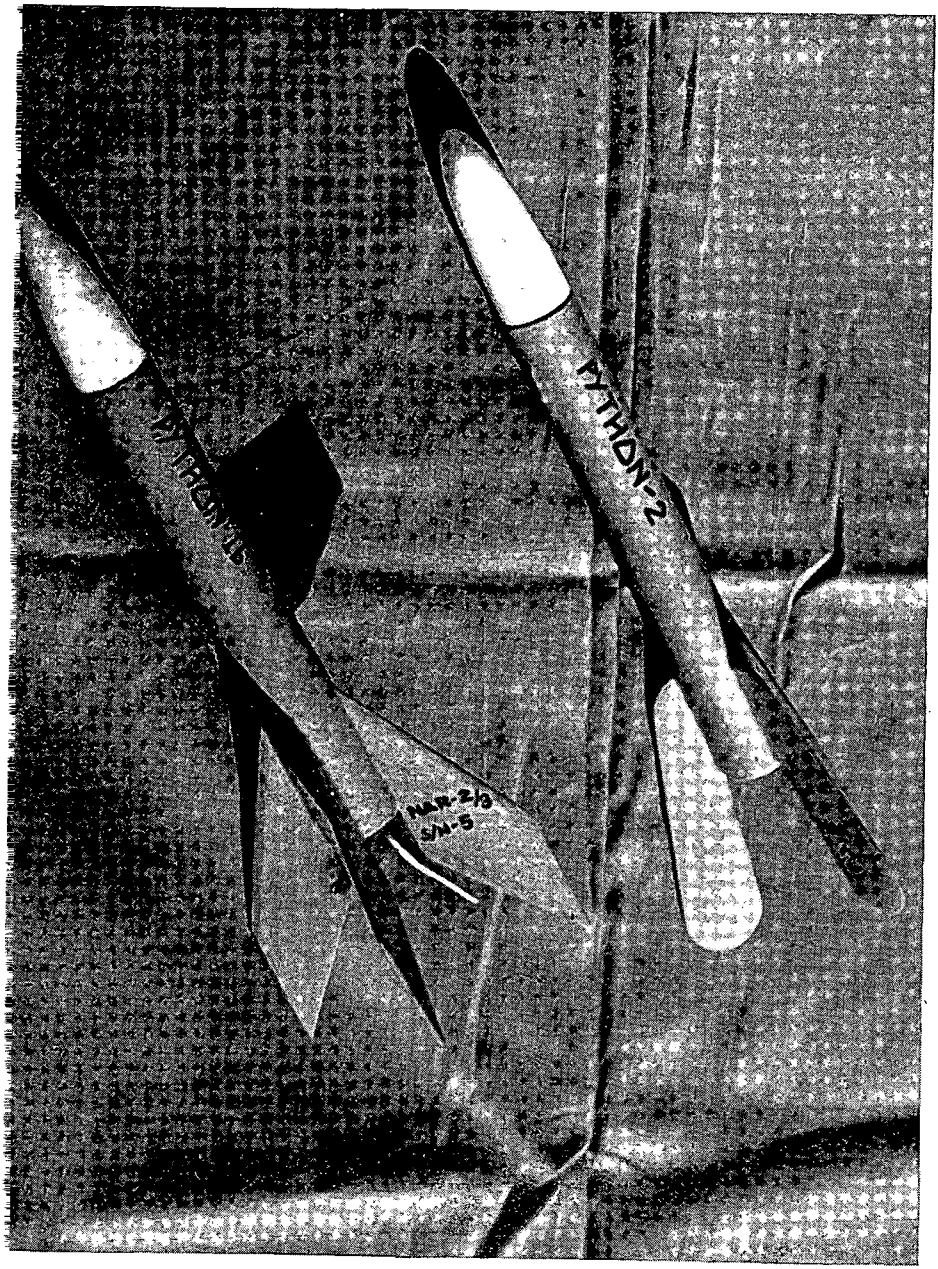

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they don't look very much like real rockets. Their noses are hemispheres or parabolas of revolution; a parabola of revolution happens to be a "constant pressure" shape for low-speed flight. The drag of these blunt-nosed shapes is 40-60% *less* than a slim cone or supersonic ogive. Bodies on model rockets are longer to give higher Reynolds Numbers and less drag, as well as greater fin moments.

Model rocket fins attempt to harness span-wise air flow for greater effectiveness and lower induced drag; fin airfoils have rounded leading edges and tapered trailing edges in an attempt to maintain laminar flow over them at high angles of attack. Surfaces on models are shiny and smooth, sometimes waxed, to provide a slick finish that will forestall turbulent boundary layer separation leading to increased drag.

Some models use boundary layer control devices such as fences to prevent flow around their bodies at an angle of attack. In fact, one young man designed a perfectly good finless model rocket utilizing flow fences around the tail to straighten out the flow in that region. Advanced modelers are also paying great attention to fin-body fillets to reduce interference drag between the body and the fins.

This is all great fun, of course. There may never be any practical commercial use for what model rocketeers are learning about low-speed ballistic flight. *But who cares?* The research we have all done has allowed altitude records to increase by nearly one hundred per cent. With one pound-second of total impulse, it is now possible to put a two-ounce model rocket over thirteen hundred feet in the air. Stability of models at launch has improved tremendously, and spot-landing contests are becoming interesting. We are using our hobby of model rocketry to learn things that nobody else has bothered to tackle.

Another example of the different shape of a subsonic rocket from that of a supersonic rocket. Although not as aesthetic in appearance, the left-hand model was designed to fly in the low subsonic regime, in contrast to the right-hand model which is patterned after supersonic rockets.

As I mentioned above, we still don't have all the answers to the problems we, as amateur scientsts, have set for ourselves. We do not even know if we are on the right track. Perhaps some aerodynamicist with an interest in low-speed flight could give us some tips, providing he will pardon my reference to aerodynamics are an arcane art.

I often wonder what other areas have been by-passed by professional endeavor because of lack of promising reward, technological sophistication, or interest. Low-speed aerodynamics happens to be only one of those areas. In our search for information, we are re-investigating the work done by the aeronautical pioneers—the Wrights, Langley, Lilienthal, Pilcher, Chanute, and others—in an at-

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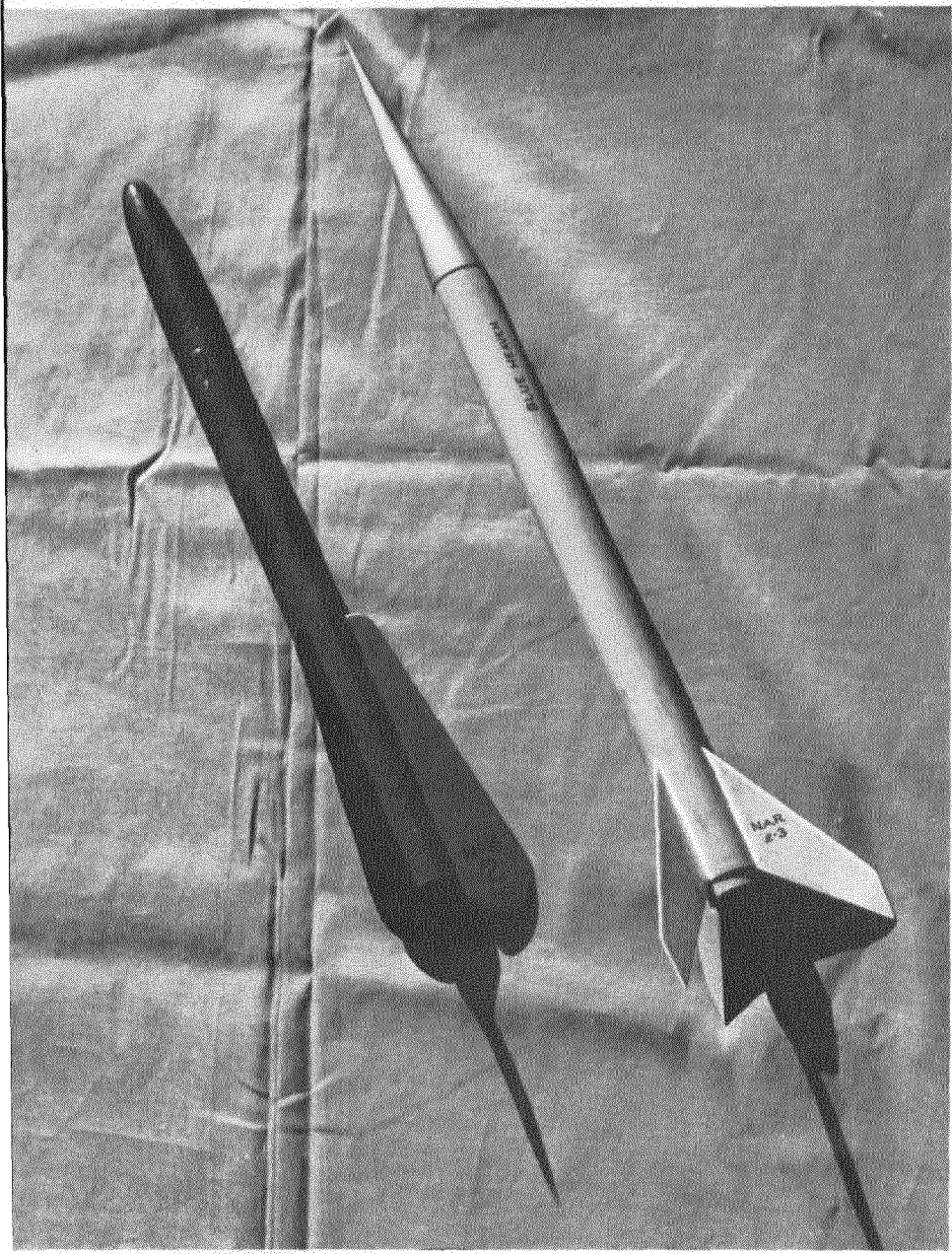

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tempt to rediscover what they learned about low-speed flight and whether or not they ever discarded an avenue of approach which would be practical today.

The factor that spurred this investigation is the history of technology itself. The first wireless receivers were solid-state units—the "coherers" of Marconi and Lodge-Muirhead; electronics engineers did not "rediscover" solid-state electronics until they had raised DeForest's vacuum triode to a high pitch of perfection. The same can be said for the work of Nichola Tesla, whose "earth current" communications are being finally developed today as un-jammable military communications systems. Kelvin's work is being critically re-examined because of the present surge in infra-red technology.

Therefore, are we missing something in low-speed flight, experimental data, or techniques, that has already been worked out?

And: In what other fields are we overlooking work that has been done before?

I happen to be amateuring in low-speed aerodynamics because I have a hobby that requires an understanding of it. I am questioning only for the sake of the answer in this endeavor. We have no real understanding of the field yet. Model rockets happen to be a very small part of it. Consider the aerodynamics of bird flight; we haven't solved that one *yet*, and we've been at it since Leonardo da Vinci over five hundred years ago. We labor to build VTOL and STOL aircraft with hummingbirds, insects, and other feathered friends pulling it off right in front of us. We have flight, but in a fast, muscly, noisy manner.

This last is best illustrated by the story of the two sea gulls at Cape Canaveral watching an *Atlas* ICBM blast off. "Just look at that thing go!" exclaimed one. The other sea gull was unperturbed: "You'd fly fast, too, if you were on fire where that thing is!"

I hope that these by-passed, ignored, unprofitable, un-investigated areas of science and technology receive some attention. It could possibly make the difference in the outcome of our technological war with the Soviet Union. It would seem logical that these areas would be the ones for amateur science to look into. Indeed, perhaps only amateur science *can* investigate these areas, because many of them cannot be tackled by professionals due to their nature. There are other problems, which I will discuss in a later article, concerning the quandry of the amateur scientist when he *does* come up with something highly useful to our society . . . and particularly to the government.

The basic difference between supersonic and subsonic rocket shapes is clear in this photograph showing a supersonic-shape model rocket at left and a subsonic-shape model at right. Neither is faster than Mach-0.2, yet right-hand model flies better and higher. Right-hand model was the first model rocket incorporating a workable, low-drag, jet-pump thrust augmenter.

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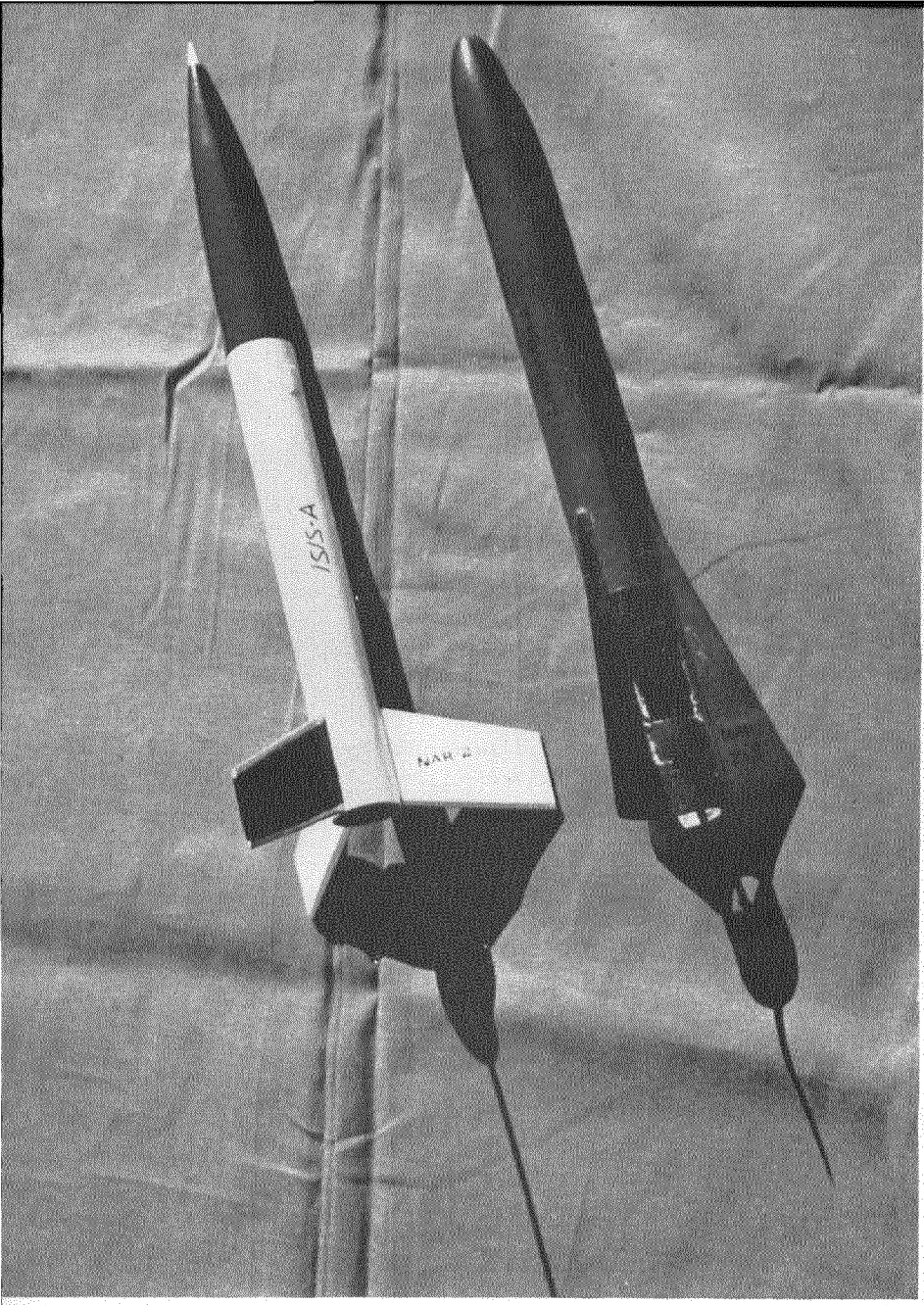

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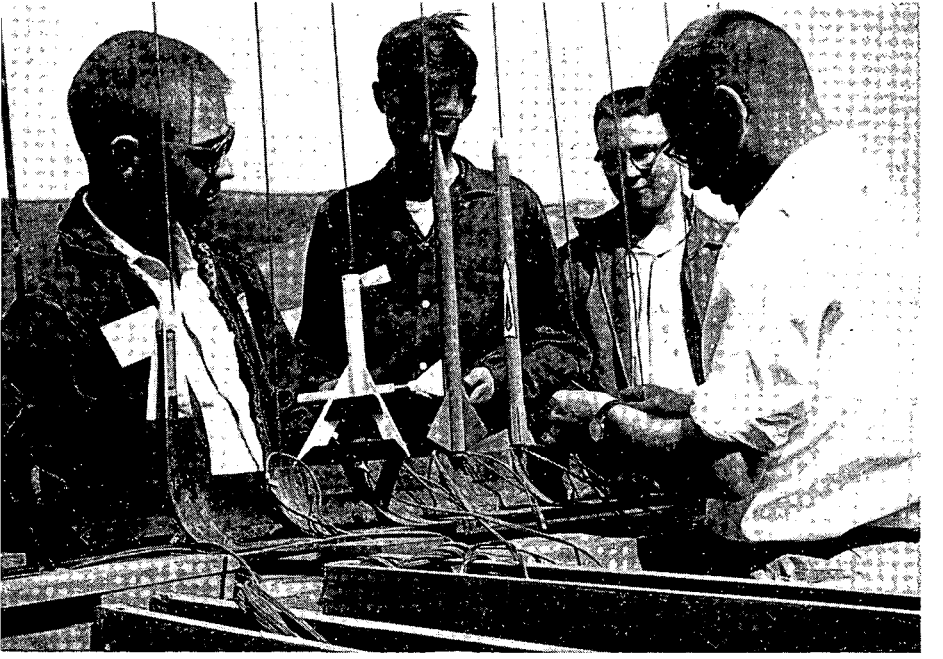

A group of model rocket hobbyists prepare their creations for flight. Ignition of the commercial model rocket engines in each model is done electrically; the launching rods provide initial guidance. All models incorporate a recovery system. Note the various airframe designs being tried out by this NAR group near Denver.

Be that as it may for the moment, the aerodynamics of sub-mach model rockets gives me great satisfaction, lots of fun, and an interesting challenge. And, after all, who could want more from a scientific hobby?

REFERENCES

There aren't many references in this field, particularly with regard to the aerodynamics of model rocketry. Various "Technical Reports" of the National Association of Rocketry contain some data. Back issues of Street & Smith's *American Modeler* magazine have scattered information on low-speed flight. One of the most complete sources of all information on drag is a book, "Fluid Dynamic Drag," by Dr. Sighard F. Hoerner, privately published by the author at 148 Busteed Drive, Midland Park, New Jersey. If you want more information, you'll have to get it yourself through experiments or wait a few years until we can publish more of our own data.

THE END

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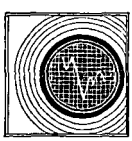
AN INTRODUCTION TO THE CALCULUS OF DESK-CLEARING

By MAURICE PRICE

Since the introduction of Parkinson's Law, many other researchers have started serious studies of the dynamics of Organizational and Administrative Systems. Mr. Price has, we feel, a valuable, if somewhat unclear, contribution.



NE of the more fascinating aspects of modern mathematics is its ability to cope with hitherto unpredictable actions of daily life. Our very life spans are now pre-ordained by the actuary. It is obvious that a relatively simple operation such as desk-clearing is amenable to an equally rigorous analysis. So, here we go . . .

It is convenient to divide desk-clearing into a number of phases, since this refinement will enable us to assess the problem more accurately. It will first be necessary to consider the process by which the chaos reaches that pinnacle demanding a clearing operation.

Assume a desk A of standard proportions. Let it be completely clear of every possible encumberance. The top is glinting under the fluorescent light. The chair is neatly drawn up before it. All drawers are empty. This is the new-born world which forms the theater of our analysis. The desk A is placed precisely between two others called B and D. These neighboring desks are assumed to be

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in an average state of confusion C_o.

Our time measurement starts from t_o, the moment when the new engineer, E arrives at his desk A. There is an initial transient period in which his fellow engineers and other generators of memos learn his name. Until E is known to a wide enough circle, his desk will remain free of reports, memos, requests, time cards, mysterious telephone messages, et cetera. There is an additional variable delay during which E fills all the drawers and covers a good part of the surface of A with his private collection of books, technical notes, catalogues, slide rules, drawing instruments, graphs, nomograms, telephone numbers, stationery and so forth. None of these will ever be of use to him, but they play a vital role in the cycle of confusion.

As we are interested only in the steady-state solution, the transient period ending at t_1 will be ignored. When it has subsided, the normal cycle of confusion begins to operate. The desk is at an initial level of confusion C_1. The confusion rises exponentially along a b (see Fig.1), reaching a critical point at b, where the desk surface is completely covered. From b to c, the exponential rise of confusion continues with steeper slope as the papers pile up in the vertical direction. At c we have reached the stagnation point of equilibrium. No work on past projects can be carried out since all the relevant papers are buried. No new work can be started as all the necessary directions and information are just not noticed. At this point the engineer is reduced to fishing old technical journals from the pile and actually reading them. This is known as "keeping up with the state of the art," and persists up to point d, where the thought first occurs to him to clear the desk.

So revolutionary an idea takes from d to e to sink in. At e there is a great flurry of activity marking the beginning of desk-clearing. The confusion drops rapidly to point f, and ends with a slower drop to g. The final point g forms the new initial level of confusion for the next cycle. Region c to e is a state of constant confusion. (The reader should ignore the fauna which have crept into Fig. 1. They merely prove that not all science is dry as dust.)

Several important conclusions follow from Fig. 1. The equation for each of the four exponential portions is of the form

$$C = K_1 \exp K_2 t$$

In this equation, K_1 is the constant of confusion and K_2 is the coefficient of chaos. These may vary from desk to desk and from engineer to engineer, but the general form of the curve is not altered. Note that the amount of work to be done does not affect the curve at all. This is because the amount of work expands to overflow the avalable desk area, a theorem which can be derived from Parkinson's results.

The initial level of confusion C_1 is slightly higher for each cycle, as is the stagnation point c. This means

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that successive cycles fall inside an exponentially increasing envelope. Eventually the time must be reached when the initial level of confusion is too high for any work to be done at all. The only cure is to promote the engineer. This gives him a new desk so that the process can start all

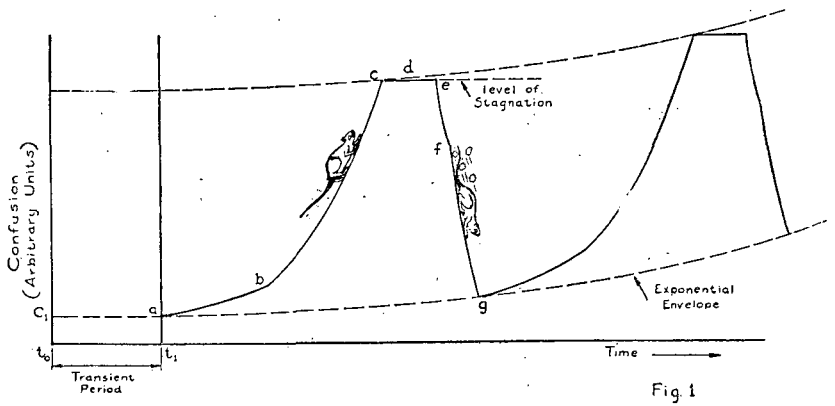

Fig. 1

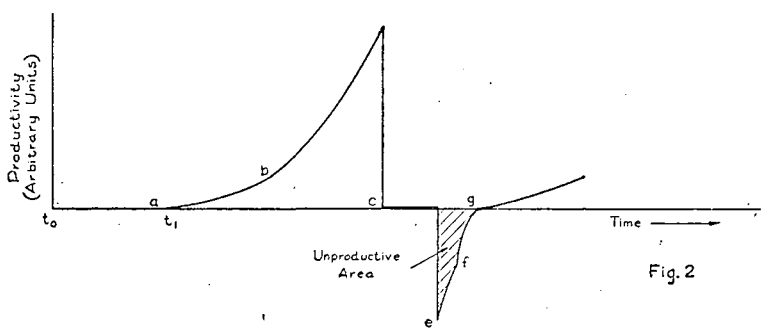

Fig. 2

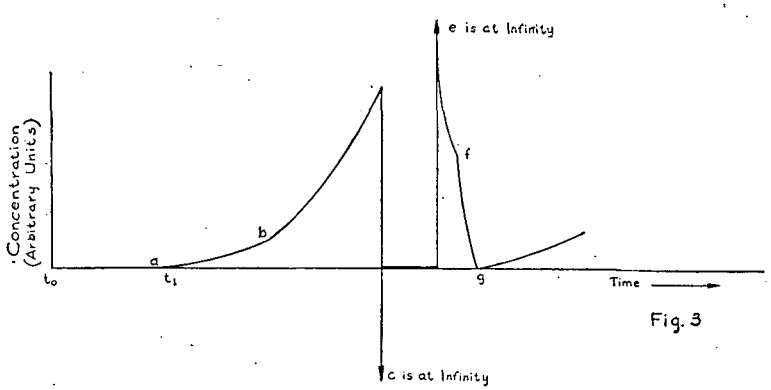

Fig. 3

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over again. If a promotion is not forthcoming, the engineer becomes bored. He will look for another job, giving as his reason that "opportunities for advancement are lacking and the work is not stimulating."

It is informative to plot the slope of the curve of confusion, as has been done in Fig. 2. The exponential portions of Fig. 1 give rise to similar exponential parts in Fig. 2, but there is a negative section during the desk-clearing process. The state of constant confusion has zero slope. Fig. 2 is clearly a curve of productivity. Note that the engineer is most productive when his desk is most chaotic. It must be the aim of management to cut the negative part of the productivity curve to a minimum. Increasing the desk size does no good, but increasing the diameter of the waste-paper basket is effective.

The slope of Fig. 2 is the second derivative of Fig. 1 and is plotted in Fig. 3. Again the exponential portions are present, but we have infinite points at the start and finish of the level of constant confusion. The new curve of Fig. 3 is undoubtedly a graph of concentration. It bears a startling resemblance to the Bilkley-Moss experiments with rats in a maze. Concentration is intimately connected with the degree of chaos. If company procedures are introduced to reduce chaos and improve communication between groups, the productivity and the concentration are bound to suffer.

We must now refer to that extreme body of men who clear their desks to an inordinate state of tidiness at the end of each day. It is obvious that their curves of productivity and concentration will be negligibly small, with the negative areas too large. They are unable to reach the heights of chaos necessary for efficient work. Parkinson has also proved this point by a different approach on the corporate level. Tidiness is anathema to industry.

What is the cure for this inevitable desk-clearing cycle? How can we avoid a state of constant confusion? It is simple. The engineer should bring his desk to the state of stagnation as soon as possible. From then on, the desk should be ignored completely. All work must be carried out by telephone. Not even a phone directory is needed, as the operator can be consulted for numbers. Only the most effective engineers can operate in this highly advanced manner. The rest will resign. The company then retains only the most productive personnel and will forge ahead. The atmosphere of individual initiative and responsibility so achieved is the result of not writing anything down. It is impossible to produce in any other way.

THE END

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THE FOUR-FACED VISITORS OF . . . . . EZEKIEL

By ARTHUR W. ORTON

Ezekiel, they say, "saw de wheel"—but he saw somewhat more than that. And Orton suggests that what he saw made perfectly good sense . . . to the understanding!

Illustrated by Orton

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E ARE told from our Sunday School days that the Bible is a "living book," the oldest of man's written works that is read and used anew, from generation to generation. It remains "living" because we are able to find new meaning to fit our daily lives. Although it is not the usual kind of new meaning, I believe that I have found something of the sort in the very old prophesies of Ezekiel.

Bible scholars have long recognized the first chapter of Ezekiel as a strange and nearly unfathomable account of a vision. I suggest that it is strange only because it is written by a man far removed from us in time and experience, about a subject totally unfamiliar to men of his time. I do not think that this was a vision in the usual sense, nor was it meant to be mystical. This particular chapter has been called "Science fiction in the Bible" and many attempts have been made to unravel the meaning of the original author, along both spiritual and mundane lines. I am convinced that this chapter is the account of an actual happening; the landing of extraterrestial beings, reported by a careful, truthful and self-possessed observer.

I am not a student of theology and therefore you may feel that I am being presumptive in attempting to throw light on a mystery as old and well-studied as Ezekiel's first chapter. I feel that any success that I may have in doing so will be due to the accident of my birth at the very beginning of an era when the events I have to describe are fact, or are about to become fact.

If, as I believe, this is an account of an actual encounter with men from space, I may be better able to interpret the meaning than a student of theology, who by training and interest, is looking for a theological meaning. I have worked with mechanical things, and as an instructor of aircraft mechanics for most of my adult life. During this time I have had to untangle a lot of mechanical misconceptions and misunderstandings. I think that this gives me some insight into this problem.

If you are not too familiar with the Old Testament, I suggest that you read through the first chapter of Ezekiel to get the feeling of the flow of words and a general idea of what sort of material we will be covering. If you have done a considerable amount of reading in the Bible, I am sure you will notice at once how different and "un-Bible-like" this chapter sounds. It isn't long. The first chapter covers little more than one page. Don't expect to get a clear picture the first time through. It seems to have an elusive quality. About the time you feel that you have hold of a fact, it seems to be contradicted in a later verse. I am going to try to show you that this is due to your own preconceived notions of what some of the words and phrases mean. You, not Ezekiel, are supplying the contradictions.

You will see that I am not going to make excuses for the words, as

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written. It is my belief that those who had the task of translating the Bible from it's original tongue and recopying it through the ages were particularly careful of this chapter because they did not understand it and were afraid of damaging it.

Let us begin with the first verse of chapter one:

The Book of The Prophet
EZEKIEL

803. Chapter 1

Now it came to pass in the thirtieth year, in the fourth month, in the fifth day of the month, as I was among the captives by the river of Chebar, that the heavens were opened, and I saw visions of God.
2. In the fifth day of the month, which was the fifth year of king Jehoiachin's captivity,
3. The word of the Lord came expressly unto Ezekiel the priest, the son of Buzi, in the land of the Chaldeans by the river Chebar; and the hand of the Lord was there upon him.

This fixes the location of this incident on the outskirts of Bagdad. The Chebar is sometimes called "The Grand Canal of Bagdad." Although the entire book was supposed to have been written by Ezekiel, the second and third verses sound like an editor's note, inserted by a later writer.

4. And I looked, and, behold, a whirlwind came out of the north, a great cloud, and a fire infolding itself, and a brightness was about it, and out of the midst thereof as the colour of amber, out of the midst of the fire.

Here is a man who had lived most of his life in arid desert country. He had probably seen whirlwinds of all kinds, from dust-devils to full-scale tornadoes. He was an accurate and honest observer, as we shall see later. If he said it was a whirlwind, it must have really been one, or at least it looked enough like one to fool him for a while. Notice that he does not say that it was high in the air, or that it came out of the sky, but, ". . . out of the north," or toward him from the north.

The first thing that he noticed was that it had fire associated with it, a strange companion for a whirlwind. There is something strange about the fire itself. He says that it "infolds itself," which suggests a fire of more active nature than Ezekiel would be accustomed to. The association of fire and whirlwind must have struck him as peculiar.

Also something amber colored was associated with the cloud and fire. He said that this color came "out of the midst," which might mean that it was above the cloud and flame, or appeared as the fire and cloud subsided, or blew to one side. Considering the detail he gives in later verses, this is quite vague, as it might be if he saw it from a distance.

5. Also out of the midst thereof came the likeness of four living creatures. And this was their appearance; they had the likeness of a man.

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Why didn't he say that out came four men? Remember that he is telling this to very primitive, superstitious people. He was himself bred in a time when the supernatural was taken for granted. Under these conditions he has gone about as far as he could by saying that they certainly looked like four men. He does not say here that he took them for angels or any other kind of supernatural beings.

6. And every one had four faces, and every one had four wings.

This short verse is very clear, yet you wonder how a creature with four faces and four wings could possibly be taken for a man, even by you or me.

Although he does not say so, we can imply that these creatures must have advanced much closer to him after they got out of the fire and cloud, for him to be able to see so much detail.

Imagine the courage it took for him to stay put in order to observe these creatures. Notice also how objective he is, never mentioning his own feelings.

7. And their feet were straight feet; and the sole of their feet was like the sole of a calf's foot; and they sparkled like the colour of burnished brass.

Each verse of the description covers one or two parts of the creatures. When Ezekiel mentions more than one part it becomes confusing, so that one verse seems to contradict another. These can usually be sorted out however. Nowhere will you find a direct contradiction.

Here he is describing the feet only. The word "straight" can be taken several ways. Does he mean *regular feet,* or feet that point straight forward, or feet that are straight up and down, like an elephant's? Probably he means regular, forward-pointing feet because he does not dwell on the point. In other places he leans heavily on simile to describe some unusual feature of the beings.

The sole of the foot sounds as if it was heavily cleated. What then has he described in this verse? For a person living in a warm climate who had never seen any footwear more complicated than a sandal, he has described a highly polished leather, plastic or metal boot very well.

8. And they had the hands of a man under their wings on their four sides; and they four had their faces and their wings.

Notice carefully that he is *not* saying that each creature had four man-like hands, one on each of four sides. He is saying that each has the normal number of hands and they are located *below* their wings. Remember that he was a careful observer and he had probably noticed that birds have wings *instead* of arms. These had both. In addition, he has given us another bit of information about the distribution of the wings. They do not appear to be arranged like a biplane, but each wing is at a ninety-degree angle from its neighboring wing like a helicopter.

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Ezekiel must have been something of a numerologist. He points out that there are four creatures, and each of the four has four faces each, and each has four wings each—but not four hands.

9. Their wings were joined one to another; they turned not when they went; they went every one straight forward.

He is not saying that the wings of one creature are joined to the wings of another creature. He is saying that each wing is joined to another wing, not directly to the creature.

The second and third parts of this verse present a mystery. We do not know what the "theys" refer to. There are three "theys" in this verse, one after another and we are given very few clues to which refer to *creatures* and which refer to *wings*. The first "they" most likely is tied to the first part of the verse and therefore refers to the wings. Given this, there are still three interpretations:

1. *The wings* turned not when *the wings* went; *The wings* went every one straight forward.
2. *The wings* turned not when *the creatures* went; *The wings* went every one straight forward.
3. *The wings* turned not when *the creatures* went; *The creatures* went every one straight forward.

None of these three statements make much of a point, whether the creatures have helicopter wings, or bird-angel wings. Let us assume then that the first "they" refers to the creatures:

1. *The creatures* turned not when *the creatures* went; *The creatures* went every one straight forward.
2. *The creatures* turned not when *the wings* went; *The wings* went every one straight forward.
3. *The creatures* turned not when *the wings* went; *The creatures* went every one straight forward.

This last statement would pretty well describe the action of the blades of an inoperative helicopter being carried forward in a straight line. It would strike Ezekiel as odd that the wings might move and turn without turning the men under them. You might wonder why he would say ". . . wings went . . ." instead of ". . . wings turned. . . " When a light breeze moves the blades of an inoperative helicopter the blades not only turn, but they change their pitch and plane in a most random manner.

Although Ezekiel has not completed his description of the creatures, we can try now to form a picture of what he saw. No matter how we bend and squeeze, we are not going to get a Michelangelo-type angel. Look at figure one. Go back over the points that Ezekiel has described. You will see that it fits quite well.

10. As for the likeness of the faces, they four had the face of a man, and the face of a lion, on the right side: and they four had the face of an ox

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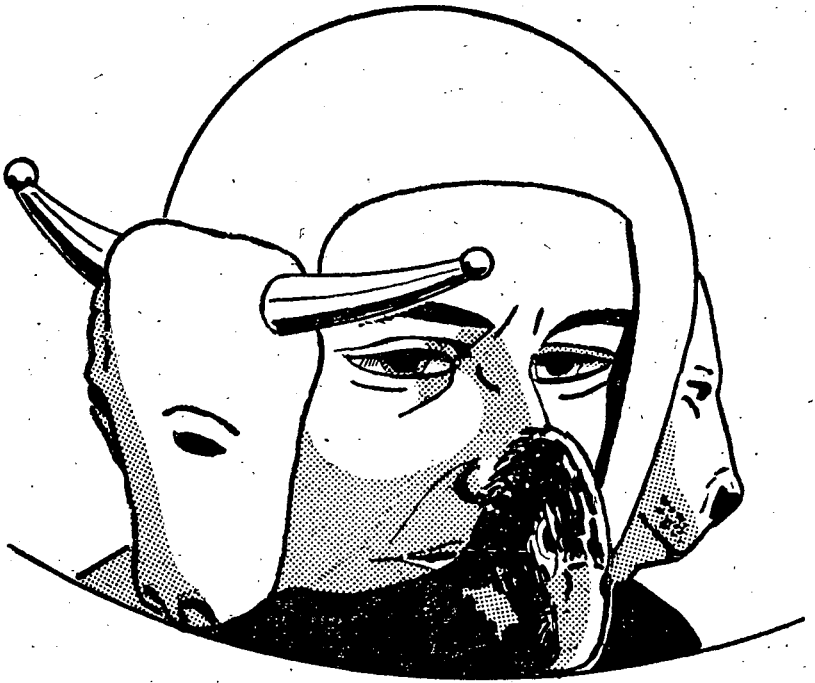

on the left side; they four also had the face of an eagle.

This again does not sound very man-like. You wonder what could have kept him from pronouncing them demons. If you will study figure two, you will see what Ezekiel described. Now look at figure three. How much better could a man living six centuries before Christ describe figure three?

11. Thus were their faces: and their wings were stretched upward; Two wings of every one were joined one to another, and two covered their bodies.

See figure one again. The arrangement is like he describes. Notice that when he talks about ". . . the wings . . ." of one creature, he apparently means the whole system of wings and attachments.

12. And they went every one straight forward: wither the spirit was to go, they went; and they turned not as they went.

Again we have trouble with the "theys." Notice however, that the first part of this verse repeats the last part of verse nine. If we were right in that verse, the first "they" in this refers to the creatures again. The second part of this verse contains a new idea, "whither the spirit was to

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go . . .", has an opposite meaning from ". . . they went . . . straight forward . . ." and, ". . . they turned not when they went." The first and last part sounds like the four creatures were marching purposefully in one direction. If then the second or middle part refers to the wings, we could read it:

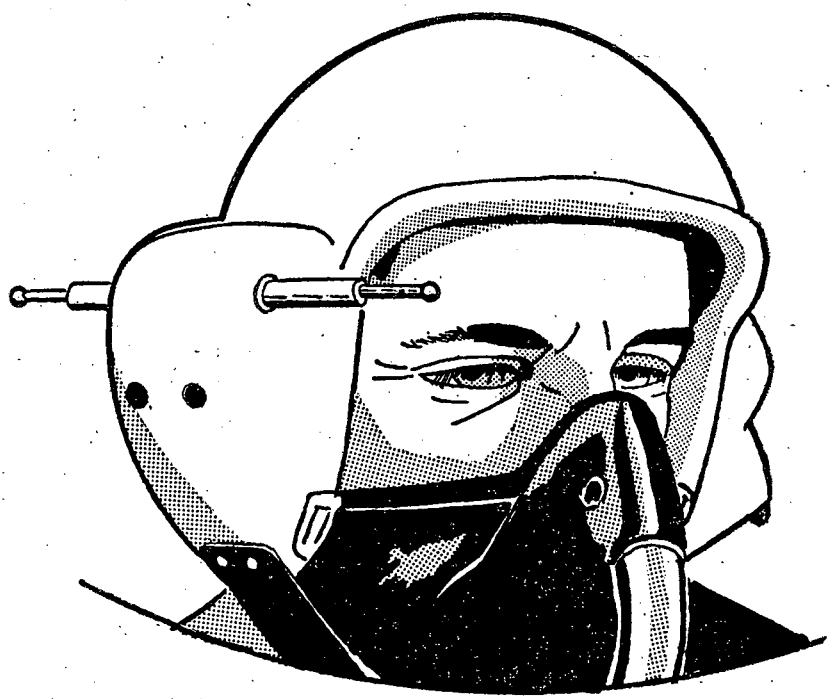
> "And *the creatures* went every one straight forward: whither the spirit was to go, *the wings* went; and *the creatures* turned not when *the wings* went."

Again we have a picture of four men walking with their inoperative helicopters moving in several different ways as the breeze and the men's motions cause them to move slightly.

Notice that Ezekiel seems to be more impressed with the wings and their motion than with any other feature of what he witnessed.

13. As for the likeness of the living creatures, their appearance was like burning coals of fire, and like the appearance of lamps: it went up and down among the living creatures; and the fire was bright, and out of the fire went forth lightning.

Here he is describing their over-all appearance. We can assume that creatures that look like men but has a surface that resembles lights, coals



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and fire must be wearing suits with a brightly colored metallic surface. The modern anodized aluminium coatings glisten and sparkle with an effect like he describes. If these are space-suits, there is a good reason for making them gaudy. If they were worn in space while working on and around a ship, they should be as bright and eye-catching as possible, in case the man became detached and floated away. He would be quite visible against the blackness of space.

14. And the living creatures ran and returned as the appearance of a flash of lightning.

This might mean that they moved swiftly, but more than likely it means that they sparkled and shined on all sides, and this was visible as they moved about.

This ends the description for a while. There are two later verses of description, but we will take this when we come to it. It is surprising that Ezekiel has organized his material so well. It reads like a scientific report. If he had headed the section that we just covered, "Description," we would not have been too surprised to find the following section headed, "Action":

15. Now as I beheld the living creatures, behold one wheel upon the earth by the living creatures, with his four faces.

If we have read Ezekiel correctly and the creatures did have helicopter attachments on their backs, we can assume that one of them now started his helicopter, which would appear as a "wheel" to Ezekiel, and probably surprised him greatly.

16. The appearance of the wheels and their work was like unto the colour of Beryl: and they four had one likeness: and their appearance and their work was as it were a wheel in the middle of a wheel.

Here we must digress in order to put ourselves into the life and time of this man because he has mentioned the wheel. A wheel did not have quite the same meaning for him as it does for you and I, living in a mechanical age. The wheel in 600 B.C. in the area around the eastern end of the Mediterranean, the most civilized part of the world at that time, had only a few very limited uses.

One use, old even in Ezekiel's time was the potter's wheel; a simple platform mounted on crude vertical bearings so that it could be turned with one hand while the clay was worked with the other. From this the grindstone and the lapidary wheel developed for working metal and stone. These early machines probably employed some form of foot treadle but even these could not turn the wheel very fast. If the stone had a large enough diameter, it was possible to get the speed at the outer edge high enough to produce sparks when grinding hard material. The "work" took place at some distance from the axis, usually at the edge of the stone.

The wheel we usually associate

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with ancient times is the cart wheel. In its earliest form it was a solid wheel, like those still in use in primitive sections of Mexico. Even with the cart wheel, ancient man would associate the edge of the wheel with the "work" of the wheel. This was the part that left a track in the mud and dust, crushed an occasional rock and fractured an occasional toe.

In order to increase the efficiency of military chariots it was necessary to build a wheel that was lighter, yet just as strong as the solid model. This was first done by cutting out "lightening holes" between the hub and rim. Pressing this invention to the ultimate produced a spoked wheel. The Egyptians used a six-spoked chariot wheel thousands of years before Ezekiel's time, and the Greeks and others had four-spoke models. This was quite an invention and in addition to it's useful aspects, it produced some rather unusual, even magical side-effects. As every child knows, if you turn your tricycle upside-down and spin the wheel, the spokes seem to vanish. All that can be seen is the rim and the parts of the hub near the center of rotation. No matter what shape the hub actually is, it too looks round like a wheel. It is very likely that such an effect was referred to as "a wheel within a wheel."

In verse 16 Ezekiel says that, "wheels and their work was the colour of beryl . . .", a blue-green color. This sounds like the emphasis is on the color at the *edge* of the wheel. This could be from a flame coming from jets on the tips of the rotors.

All of the creatures must have started their rotors. (". . . they four had one likeness.") They looked like ". . . a wheel in the middle of a wheel." Or the spinning spokes of a wheel. Notice also that he never mentions "wings" and "wheels" at the same time, for when one appears the other vanishes.

17. When they went, they went upon their four sides: and they turned not when they went.

If four men were standing fairly close together on the ground with running helicopters, they would tend to spread out as they left the ground, so as to not run into each other. Moreover, with a helicopter, it is not necessary to *face* the direction you intend to go. This sounds like four men lifting off the ground, spreading out slightly and starting up and away, in formation.

18. As for their rings, they were so high that they were dreadful; and their rings were full of eyes round about them four.

The four creatures are now high in the air above Ezekiel, a dreadful and awe-inspiring sight for a man of Ezekiel's time. Their "rings" obviously are the flames from their tip-jets, seen from below—the only part of the wheel now visible from far below. And the rings *would* be full of eyes. When a jet or rocket motor is operating there is a shock wave generated in the tailpipe which tends to cut the exhaust gas into segments.

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Time exposures of jet aircraft at night often show this. When a tip-jet is operating, these bright, evenly spaced spots give it the appearance of a string of pearls, ". . . full of eyes round about them . . ."

19. And when the living creatures went, the wheels went up by them: and when the living creatures were lifted up from the earth, the wheels were lifted up.

Ezekiel makes it clear that he does not know whether the men are lifting the wheels or the wheels lifting the men, but both went up together.

20. Withersoever the spirit was to go, they went, thither was their spirit to go; and the wheels were lifted over against them: for the spirit of the living creatures was in the wheels.

This is a most sophisticated opinion. Although Ezekiel was describing only what he saw, he could not help but have some opinions about the creatures. In verse nineteen he makes it clear that he does not know whether man is lifting the machine, or the other way around, but here he makes it clear that whichever, there is no doubt that the creatures are *controlling*. They are not being carried off by the will of the wheel.

21. When those went, these went; and when those stood, these stood; and when those were lifted up from the earth, the wheels were lifted up over against them: for the spirit of the living creatures was in the wheels.

This carries the idea of control one step farther. Not only are the men controlling the wheels, but they are self-controlled: They are flying in formation.

22. And the likeness of the firmament upon the heads of the living creatures was as the colour of terrible crystal, stretched forth over their heads above.

Perhaps this verse was moved out of it's original position, for it returns to the description of the creatures. You may have noticed that many of the verses are written so that it is in part, an enlargement of the thought put forward in the preceding verse, and part new thought, to be enlarged upon in the following verse. Verses twenty-two and twenty-three *seem* to go together. Both would fit the rest of the chapter better if they were between verses twelve and thirteen.

What is meant by "firmament"? These people had no term for a hollow-sphere. Most spherical objects were not hollow. They had no soap, so they had no soap bubbles. The most common thing to compare a hollow sphere to was the sky, the bowl of the heavens—the firmament. This crystal-clear bubble was over the heads of the creatures, one on each creature.

We will come to the word firmament again, but notice that this is, ". . . the *likeness* of the firmament . . . ", not the firmament itself. Later verses speak only of the "firmament".

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23. And under the firmament were their wings straight, the one toward the other: every one had two, which covered on this side, and every one had two which covered on that side, their bodies.

If you changed ". . . under the firmament . . ." to, ". . . below the sky" you would get a clearer picture. If you look at the picture of a house, the roof is, "below the sky," if you start at the top and work down. If you start at the ground and work up, the roof is, "at the top" of the house. Ezekiel's description of the wings, which is continued in this verse, concerns the wings "at the top." They are (connected), ". . . one toward the other, about like in figure one.

24. And when they went, I heard the noise of their wings, like the noise of great waters, like the voice of the Almighty, the voice of speech, as the noise of the host: when they stood they let down their wings.

If you have ever stood near a running tip-jet, or any jet engine, I think you will know what Ezekiel means. The last statement is most interesting. It seems that when the creatures landed again they detached the helicopter mechanisms and set them down, as anyone will with a heavy back-pack who is resting or waiting.

25. And there was a voice from the firmament that was over their heads, when they stood, and had let down their wings.

This voice, or sound, was not from the *likeness* of the firmament, but from the sky, as they stood there with their wings off.

This is the end of Ezekiel's attention to the four creatures.

26. And above the firmament that was over their heads was the likeness of a throne, as the appearance of a sapphire stone; and upon the likeness of the throne was the likeness as the appearance of a man above upon it.

Out of the sky comes a man on a green seat. But a throne is more than a chair. It is usually associated with a platform. This may be some kind of flying platform similar to those being tested for the transporting of infantry.

27. And I saw as the colour of amber, as the appearance of fire round about within it, from the appearance of his loins even upward, and from the appearance of his loins even downward, I saw as it were the appearance of fire, and it had brightness round about.

Since this thing was high over their heads, and he saw fire round about it, the fire may have been on the under side. What he says about the man is very like what he said about the other four, except that he describes the man from the waist up and down, as if he could not see the area near the man's waist.

28. As the appearance of the bow that is in the cloud in the day of rain, so was the appearance of the

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brightness round about. This was the appearance of the likeness of the glory of the Lord. And when I saw it, I fell upon my face, and I heard a voice of one who spake.

What prismatic effect, brighter than the outdoor desert sunshine is hard to imagine, but a large shining object close at hand would be pretty terrifying. It seems strange that Ezekiel would not throw himself upon the ground, after withstanding all he had seen up till now, but we must remember that a man seated on a throne, a flying throne at that might have a lot more meaning for him than it would for you and me. If this object happened to come down closer to him than the other creatures had, he might well have broken.

We have now covered every verse of the first chapter quite thoroughly. Since the Book of Ezekiel contains forty-eight chapters, we might fear that this is just the beginning of a long and tiring study. Fortunately or unfortunately this is not the case. The second chapter begins:

804.
And he said unto me, Son of man, stand upon thy feet, and I will speak to thee.
2. And the spirit entered into me when he spake unto me, and set me upon my feet, that I heard him that spake unto me.
3. And he said unto me, Son of man, I send thee to the children of Israel, to a rebellious nation that hath rebelled against me: they and their fathers have transgressed against me, even unto this very day.

This typically prophetic writing goes on for many pages, telling the woes and sins of the Israelites. Reference is made in a few places to the material in the first chapter, but even this dies out before the end of the book.

No mention is made again of the living creatures till chapter three where the following verse is found:

13. I heard also the noise of the wings of the living creatures that touched one another, and the noise of the wheels over against them, and a noise of great rushing.

This combines some of the ideas of earlier verses without adding any new information. Notice that writer has the notion that the wings of one creature touched those of another, or that the creatures touched one another.

This verse is typical of several more scattered throughout the first third of the book. All the verses mentioning the living creatures after the first chapter are more dramatic and all fail to continue the style of a careful reporter. No new ideas are advanced, but some rather unusual contradictions are introduced, by using several parts of several verses of Chapter One. Chapter Ten reads like an attempt at rephrasing Chapter One and Chapter Eleven is the last mention of the living creatures in the entire book.

Although it contains no further information on the living creatures,

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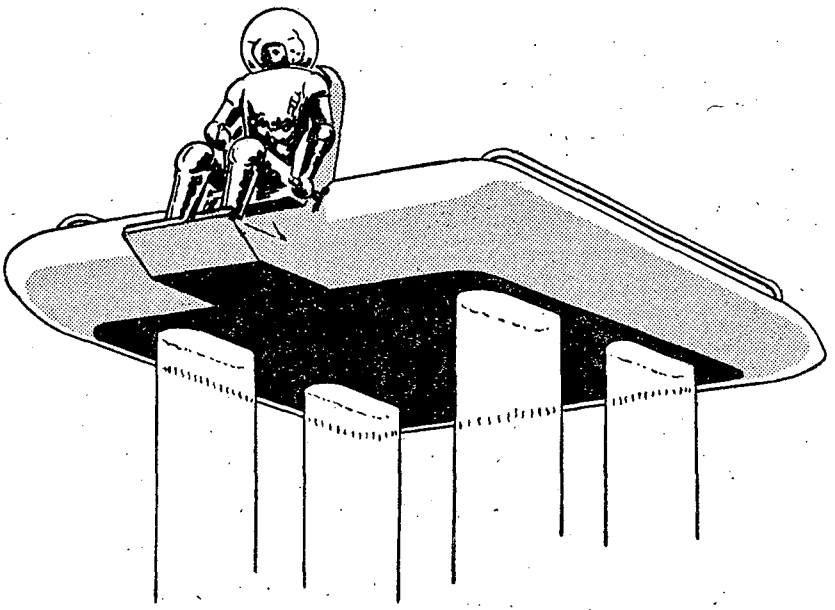

Chapter Three has a verse that should be mentioned. Verse fifteen sounds like a fitting conclusion to the first chapter:

15. Then I came to them of the captivity at Tel-Abib, that dwelt by the river Chebar, and I sat where they sat, and remained there astonished among them for seven days.

Just what do we have? We have a description of four spacesuited and helicopter-equipped men, getting off of, or out of something that landed in a cloud of dust or smoke. The four men start their helicopters, take off and fly to some height. On returning to the ground they remove their flying gear and wait. They are met by a fifth man, riding on a flying platform. Such an event would cause some interest in any community today, but in those times it could only be interpreted as supernatural—a miracle. The miracle may well be that the story has been preserved for us, twenty-six centuries later.

A word for word interpretation is only part of the oddity of this chapter. Several other aspects are worth pondering. The whole chapter has a well-worn feeling, as though the author had told and re-told it many times. It reads like a deposition, taken down by a police officer, after the witness, who prides himself on truthfulness, has told the story over and over to his incredulous friends. It has a certain poetic beauty. It has the style of one who is telling you the truth, no matter whether you

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are going to believe it or not. It is the presentation of a tableau that makes no sense to the man who witnessed it, or to those to whom he is describing it.

The product of a man's imagination is tied to his own experience, his own time. A wonderful tale of the supernatural may sound very imaginative to the contemporary of the teller, but it will date itself to a later generation. The lives of the Greek gods are related to the lives of the early Greeks. An imaginative science-fiction writer such as Jules Verne is limited in the same way. As good as he was, experience has set an outer limit to his imagination. Ezekiel's tale is not in this class. To his contemporaries, it was out of step with reality. To us it is real enough, but out of step with time. The most credible explanation is that it really happened.

Perhaps there are some points of my interpretation that you do not agree with, but as a whole the story does hang together rather well. If you have the feeling that it would be easy to fit the words around an entirely different set of circumstances, I suggest that you try.

It is interesting to know that some years ago a verbal battle raged in theological circles as to whether Ezekiel wrote the Book of Ezekiel. One school of thought held that he did, while the other school held that the first chapter was a "forgery," written in the third century before Christ, and tacked on as a sort of "leader" to Ezekiel's book. For our purposes it cannot be a forgery. It makes little difference how long ago it was written, so long as it was not since World War II!

Suppose Ezekiel or some ancient man actually saw what I have proposed. What are the possible explanations? Is it possible that some ancient race, unknown to us, could have developed such equipment? It is not likely. During the last one hundred years we have been prodding about in the earth and finding so many ancient records that someone else besides Ezekiel would certainly have left us a report on them.

The things that were science fiction twenty years ago are solid fact now. We know that a landing on the Moon is only a question of time, a few years at the most. The planets of our Solar System will follow, at least some before the turn of the century, probably. As for the planets of neighboring stars we cannot say. We have no way of exploring them at present, but that is not the same as saying that we never will. If the past performance of the human race is any measure, they will likely fall to exploration within two hundred years.

If you concede that it is possible that we can visit other star systems in a future not too distant, why then could we not have been visited some time in the past? It may tend to deflate our ego to think that there may be intelligent beings not too different from us who are advanced beyond us. It need not. One of the most striking features of Ezekiel's story, if

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it has been decoded correctly, is that these beings are very much like we are, right at the present time. That puts them three or four thousand years ahead of us, a very small amount indeed when we consider the long sweep of human life and development before the dawn of written history.

We are so used to stories of "Bug-eyed Monsters" coming to Earth, that the idea of beings from other worlds looking and acting human seems fantastic. It should not. There is good sound scientific reason to believe that there is little chance of it being any other way. Life is a delicate and fragile thing when compared to cosmic extremes of temperature and environment in our universe. If life formed on earth as science now believes that it did, we must have had just the right size planet at just the right distance from a particular type of star. While such extremely narrow limits are going to reduce the number of places in the universe where life can develop, it is also going to limit the *differences*. In our creation things operate by rule. The rule is that in similar circumstance there are similar solutions to a problem. Man is the solution of the problem of building the highest form of life on Earth. On a similar planet we can expect to find a similar solution. This is simply the extension of the theory of *parallel evolution* to a cosmic scale.

If then, we were visited by people from another world, what were they doing here? Strangely enough, there is considerable evidence of what they were up to from Ezekiel's own testimony. Let us suppose that these creatures were very much like we expect to be in five hundred years. They have come from some other star system in a ship whose principle of operation is as yet unknown to us. We can assume that it was a rather large ship, being that there were five beings on board at once, and we can presume that enough of a crew remained aboard to return it home in case something happened to the explorers. How would we proceed in such a case?

It is not likely that such a large ship would be brought down to the surface of the earth. After arriving in the neighborhood of the earth, it would be put into orbit, and the surface of the earth would be studied through telescopes for days or weeks. The entire radio spectrum would be scanned to determine if there were inhabitants below, capable of operating electrical equipment. A small—manned or unmanned—flyer would be sent down into the upper atmosphere to determine the level of radioactivity, air components, spore and bacteria count and radio signals incapable of penetrating the atmosphere. From the ship the land areas would be mapped and studied. Any large object on the ground that appeared to be of an artificial nature would be given particular attention. During the night-time hours below, these objects and areas would be very carefully observed for signs of light.

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In the case of our visitors of twenty-six centuries ago, this is what they would have found: Quite a few artificial works could be seen. Cultivated fields and large buildings would be easily visible in many places around the eastern end of the Mediterranean. The Pyramids were old even then. (The Great Wall in China probably had not been started.) There would be no radio sounds, except for an occasional lightning click. We do not know how well their cities were lighted at night, but they were probably too dim to see. Tiny orange pinpoints of light from outdoor bonfires could probably be seen around the globe, but there would be more of them around the Mediterranean and in the East and Near East than anywhere else. The radioactivity level would be low. Our visitors would conclude that the inhabitants were either in the early stages of civilization, or were once highly civilized and now sunk back to a primitive stage. They would know that this was due to something other than atomic war.

We have to conclude that these were moral beings. If the conditions below were as they seemed to be, that of an early civilization, they would not want to interfere. They would want to observe without being observed, so even if it were technically possible they would not want to bring a large ship down. They would send down as small and inconspicuous a vehicle as possible.

We usually picture such a craft as a small version of the larger ship, or a large—by our standards—rocket, or an aircraft similar to our Dyna-soar. For people this advanced technologically something a lot simpler might be used. It might be an open vehicle, similar to our flying platforms, but with vastly more powerful nuclear power plants. The men going down would have to wear air-tight suits—spacesuits, and would have to leave them on all the time they were below, for fear of becoming infected with molds and viruses that the natives would long since have become immune to. One man, the pilot, would stay with the platform while the others did the observing and recording.

The flying platform would have no need for rapid forward motion, at least inside the atmosphere and therefore would have little need for streamlining or protective covering for the passengers, who would carry their equipment with them. Most of the equipment for the survey would be built into the suits. They would each carry a set of portable helicopter attachments so they could cover more ground in a hurry. Like small helicopters of our time, these probably would have a rather limited speed and range, but they would be extremely maneuverable.

The platform on the other hand, being nuclear powered, would probably be very powerful and have almost unlimited range, but it would be less maneuverable. The products of its exhaust might be radioactive and therefore its operators would be reluctant to operate it above or near

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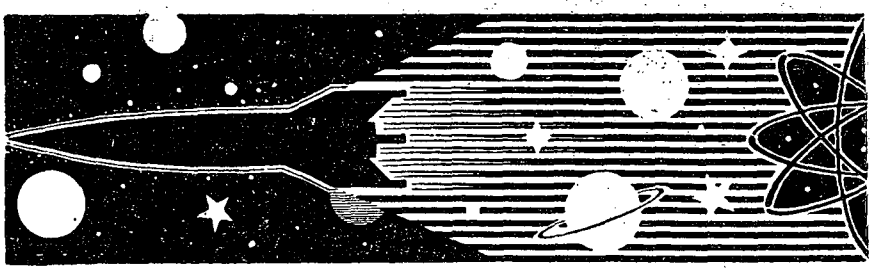
the natives of the planet, or places that they frequented.

As they push away from the mother-ship the spacemen would be in free-fall and would tend to "float" nearby until they turned the bottom side of the platform toward the direction of their orbit and applied power. They would then drop toward the surface, but with almost unlimited power available they could keep the downward component of their fall within limits and prevent overheating. They could probably be on the surface in less than an hour.

The first and most likely area of exploration would be Egypt. The platform could be landed a few miles back from the Nile and be in completely unoccupied desert. The four helicopter-equipped explorers could put on their rotating-wing backpacks and by keeping low, come up very close to some center of civilization without being seen. By going up to a few thousand feet they could observe a fairly large area. Even if they were spotted, they would be small and unrecognizable, and cause a minimum amount of excitement.

Like any tourist in any age they would probably be most interested in the territory around the pyramids. When they had finished here they might want to look over the country around what is now Bagdad, but *then* only near the capital city of Nebuchadnezzar's empire. This is about eight hundred miles away, an impractical trip by helicopter, so they would return to the platform, climb to a few hundred thousand feet, and scoot over in a few minutes. Here they would land again in some uninhabited spot and repeat the maneuver. This country was probably sprinkled with more people than they expected. Maybe that's why this is the legendary flying carpet country, or maybe not. At any rate, one lonely military prisoner, working by himself near the banks of a stream must have seen them. Even if they did notice him, what possible harm could he do? In the present state of the civilization who would remember what he said or even believe him? I do.

THE END



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HIDING...

By POUL ANDERSON

Illustrated by Schoenherr

CAPTAIN Bahadur Torrance received the news as befitted a Lodgemaster in the Federated Brotherhood of Spacemen. He heard it out, interrupting only with a few knowledgeable questions. At the end, he said calmly, "Well done, Freeman Yamamura. Please keep this to yourself till further notice. I'll think about what's to be done. Carry on." But when the engineer officer had left the cabin—the news had not been the sort you tell on the intercom—he poured himself a triple whisky, sat down, and stared emptily at the viewscreen.

He had traveled far, seen much, and been well rewarded. However, promotion being swift in his difficult line of work, he was still too young not to feel cold at hearing his death sentence.

The screen showed such a multitude of stars, hard and winter-brilliant, that only an astronaut could recognize individuals. Torrance sought past the Milky Way until he identified Polaris. Then Valhalla would lie so-and-so many degrees away, in *that* direction. Not that he could see a gee-type sun at this distance, without optical instruments more powerful than any aboard the *Hebe G.B.* But he found a certain comfort in knowing his eyes were sighted toward the nearest League base—houses, ships, humans, nestled in a green valley on Freya—in this almost uncharted section of our galactic arm. Especially when he expected never to land there again.

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....PLACE

You'd think it'd be a little difficult for the owners and builders of a spaceship to hide themselves on board their own ship, so aliens couldn't tell the spacemen from the zoo!

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The ship hummed around him, pulsing in and out of four-space with a quasi-speed that left light far behind and yet was too slow to save him.

Well . . . it became the captain to think first of the others. Torrance sighed and stood up. He spent a moment checking his appearance; morale was important, never more so than now. Rather than the usual gray coverall of shipboard, he preferred full uniform: blue tunic, white cape and culottes, gold braid. As a citizen of Ramanujan planet, he kept a turban on his dark aquiline head, pinned with the Ship-and-Sunburst of the Polesotechnic League.

He went down a passageway to the owner's suite. The steward was just leaving, a tray in his hand. Torrance signaled the door to remain open, clicked his heels and bowed. "I pray pardon for the interruption, sir," he said. "May I speak privately with you? Urgent."

Nicholas van Rijn hoisted the two-liter tankard which had been brought him. His several chins quivered under the stiff goatee; the noise of his gulping filled the room, from the desk littered with papers to the Huy Brasealian jewel-tapestry hung on the opposite bulkhead. Something by Mozart lilted out of a taper. Blond, big-eyed, and thoroughly three-dimensional, Jeri Kofoed curled on a couch, within easy reach of him where he sprawled in his lounger. Torrance, who was married but had been away from home for some time, forced his gaze back to the merchant.

"Ahhh!" Van Rijn banged the empty mug down on a table and wiped foam from his mustaches. "Pox and pestilence, but the first beer of the day is good! Something with it is so quite cool and, um, by damn, what word do I want?" He thumped his sloping forehead with one hairy fist. "I get more absent in the mind every week. Ah, Torrance, when you are too a poor old lonely fat man with all powers failing him, you will look back and remember me and wish you was more good to me. But then is too late." He sighed like a minor tornado and scratched the pelt on his chest. In the near tropic temperature at which he insisted on maintaining his quarters, he need only wrap a sarong about his huge body. "Well, what begobbled stupiding is it I must be dragged from my all too much work to fix up for you, ha?"

His tone was genial. He had, in fact, been in a good mood ever since they escaped the Adderkops. (Who wouldn't be? For a mere space yacht, even an armed one with ultrapowered engines, to get away from three cruisers, was more than an accomplishment; it was very nearly a miracle. Van Rijn still kept four grateful candles burning before his Martian sandroot statuette of St. Dismas.) True, he sometimes threw crockery at the steward when a drink arrived later than he wished, and he fired everybody aboard ship at least once a day. But that was normal.

Jeri Kofoed arched her brows.

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"Your first beer, Nicky?" she murmured. "Now really! Two hours ago—"

"*Ja,* but that was before midnight time. If not Greenwich midnight, then surely on some planet somewhere, *nie?* So is a new day." Van Rijn took his churchwarden off the table and began stuffing it. "Well, sit down, Captain Torrance, make yourself to be comfortable and lend me your lighter. You look like a dynamited custard, boy. All you youngsters got no stamina. When I was a working spaceman, by Judas, we made solve all our own problems. These days, death and damnation, you come ask me how to wipe your noses! Nobody has any guts but me." He slapped his barrel belly. "So what is be-jingle-bang gone wrong now?"

Torrance wet his lips. "I'd rather speak to you alone, sir."

He saw the color leave Jeri's face. She was no coward. Frontier planets, even the pleasant ones like Freya, didn't breed that sort. She had come along on what she knew would be a hazardous trip because a chance like this—to get an in with the merchant prince of the Solar Spice & Liquors Company, which was one of the major forces within the whole Polesotechnic League—was too good for an opportunistic girl to refuse. She had kept her nerve during the fight and the subsequent escape, though death came very close. But they were still far from her planet, among unknown stars, with the enemy hunting them.

"So go in the bedroom," Van Rijn ordered her.

"Please," she whispered. "I'd be happier hearing the truth."

The small black eyes, set close to Van Rijn's hook nose, flared. "Foulness and fulminate!" he bellowed. "What is this poppies with cocking? When I say frog, by billy damn, you jump."

She sprang to her feet, mutinous. Without rising, he slapped her on the appropriate spot. It sounded like a pistol going off. She gasped, choked back an indignant screech, and stamped into the inner suite. Van Rijn rang for the steward.

"More beer this calls for," he said to Torrance. "Well, don't stand there making bug's eyes! I got no time for fumblydiddles, even if you overpaid loafer do. I got to make revises of all price schedules on pepper and nutmeg for Freya before we get there. Satan and stenches! At least ten per cent more that idiot of a factor could charge them, and not reduce volume of sales. I swear it! All good saints, hear me and help a poor old man saddled with oatmeal-brained squatpots for workers!"

Torrance curbed his temper with an effort. "Very well, sir. I just had a report from Yamamura. You know we took a near miss during the fight, which hulled us at the engine room. The converter didn't seem damaged, but after patching the hole, the gang's been checking to make sure.

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And it turns out that about half the circuitry for the infra-shield generator was fused. We can't replace more than a fraction of it. If we continue to run at full quasi-speed, we'll burn out the whole converter in another fifty hours."

"Ah, s-s-so." Van Rijn grew murmurous. The snap of the lighter, as he touched it to his pipe, came startlingly loud. "No chance of stopping altogether to make fixings? Once out of hyperdrive, we would be much too small a thing for the bestinkered Adderkops to find. Hey?"

"No, sir. I said we haven't enough replacement parts. This is a yacht, not a warship."

"Hokay, we must continue in hyperdrive. How slow must we go, to make sure we come within calling distance of Freya before our engine burns out?"

"One tenth of top speed. It'd take us six months."

"No, my captain friend, not so long. We never reach Valhalla star at all. The Adderkops find us first."

"I suppose so. We haven't got six months' stores aboard anyway." Torrance stared at the deck. "What occurs to me is, well, we could reach one of the nearby stars. There just barely might be a planet with an industrial civilization, whose people could eventually be taught to make the circuits we need. A habitable planet, at least . . . maybe—"

"Nie!" Van Rijn shook his head till the greasy black ringlets swirled about his shoulders. "All us men and one woman, for life on some garbagey rock where they have not even wine grapes? I'll take an Adderkop shell and go out like a gentleman, by damn!" The steward appeared. "Where you been snoozing? Beer, with God's curses on you! I need to make thinks! How you expect I can think with a mouth like a desert in midsummer?"

Torrance chose his words carefully. Van Rijn would have to be reminded that the captain, in space, was the final boss. And yet the old devil must not be antagonized, for he had a record of squiriming between the horns of dilemmas. "I'm open to suggestions, sir, but I can't take the responsibility of courting enemy attack."

Van Rijn rose and lumbered about the cabin, fuming obscenities and volcanic blue clouds. As he passed the shelf where St. Dismas stood, he pinched the candles out in a marked manner. That seemed to trigger something in him. He turned about and said, "Ha! Industrial civilizations, *ja,* maybe so. Not only the pest-begotten Adderkops ply this region of space. Gives some chance perhaps we can come in detection range of an un-beat-up ship, *nie?* You go get Yamamura to jack up our detector sensitivities till we can feel a gnat twiddle its wings back in my Djakarta office on Earth, so lazy the cleaners are. Then go off this direct course and run a standard naval search pattern at reduced speed."

"And if we find a ship? Could belong to the enemy, you know."

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"That chance we take."

"In all events, sir, we'll lose time. The pursuit will gain on us while we follow a search-helix. Especially if we spend days persuading some non-human crew who've never heard of the human race, that we have to be taken to Valhalla immediately if not sooner."

"We burn that bridge when we come to it. You have might be a more hopeful scheme?"

"Well—" Torrance pondered a while, blackly.

The steward came in with a fresh tankard. Van Rijn snatched it.

"I think you're right, sir," said Torrance. "I'll go and—"

"Virginal!" bellowed Van Rijn.

Torrance jumped. "What?"

"Virginal! That's the word I was looking for. The first beer of the day, you idiot!"

The cabin door chimed. Torrance groaned. He'd been hoping for some sleep, at least, after more hours on deck than he cared to number. But when the ship prowled through darkness, seeking another ship which might or might not be out there, and the hunters drew closer—"Come in."

Jeri Kofoed entered. Torrance gaped, sprang to his feet, and bowed. "Freelady! What, what, what a surprise! Is there anything I can do?"

"Please." She laid a hand on his. Her gown was of shimmerite and shameless cut, but the look she gave Torrance had nothing to do with that. "I had to come, Lodgemaster. If you've any pity, you'll listen to me."

He waved her to a chair, offered cigarettes, and struck one for himself. The smoke, drawn deep into his lungs, calmed him a little. He sat down on the opposite side of the table. "If I can be of help to you, Freelady Kofoed, you know I'm happy to oblige. Uh . . . Freeman van Rijn—"

"He's asleep. Not that he has any claims on me. I haven't signed a contract or any such thing." Her irritation gave way to a wry smile. "Oh, admitted, we're all his inferiors, in fact as well as in status. I'm not contravening his wishes, not really. It's just that he won't answer my questions, and if I don't find out what's going on I'll have to start screaming."

Torrance weighed a number of factors. A private explanation, in more detail than the crew had required, might indeed be best for her. "As you wish, Freelady," he said, and related what had happened to the converter. "We can't fix it ourselves," he concluded. "If we continued traveling at high quasi-speed, we'd burn it out before we arrived; and then, without power, we'd soon die. If we proceed slowly enough to preserve it, we'd need half a year to reach Valhalla, which is more time than we have supplies for. Though the Adderkops would doubtless track us down within a week or two."

She shivered. "Why? I don't understand." She stared at her glowing cigarette end for a moment, until a degree of composure returned, and with a touch of humor. "I may pass

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for a fast, sophisticated girl on Freya, captain. But you know even better than I, Freya is a jerkwater planet on the very fringe of human civilization. We've hardly any spatial traffic, except the League merchant ships, and they never stay long in port. I really know nothing about military or political technology. No one told me this was anything more important than a scouting mission, because I never thought to inquire. Why should the Adderkops be so anxious to catch us?"

Torrance considered the total picture before framing a reply. As a spaceman of the League, he must appreciate how little the enemy actually meant to colonists who seldom left their home world. The name "Adderkop" was Freyan, a term of scorn for outlaws who'd been booted off the planet a century ago. Since then, however, the Freyans had had no direct contact with them. Somewhere in the unexplored deeps beyond Valhalla, the fugitives had settled on some unknown planet. Over the generations, their numbers grew, and so did the numbers of their warships. But Freya was still too strong for them to raid, and had no extraplanetary enterprises of her own to be harried. Why should Freya care?

Torrance decided to explain systematically, even if he must repeat the obvious. "Well," he said, "the Adderkops aren't stupid. They keep somewhat in touch with events, and know the Polesotechnic League wants to expand its operations into this region. They don't like that. It'd mean the end of their attacks on planets which can't fight back, their squeezing of tribute and their overpriced trade. Not that the League is composed of saints; we don't tolerate that sort of thing, but merely because freebooting cuts into the profits of our member companies. So the Adderkops undertook, not to fight a full-dress war against us, but to harass our outposts till we gave it up as a bad job. They have the advantage of knowing their own sector of space, which we hardly do at all. And we were, indeed, at the point of writing this whole region off and trying some place else. Freeman van Rijn wanted to make one last attempt. The opposition to doing so was so great that he had to come here and lead the expedition himself.

"I suppose you know what he did. Used an unholy skill at bribery and bluff, at extracting what little information the prisoners we'd taken possessed, at fitting odd facts together. He got a clue to a hitherto untried segment. We flitted there, picked up a neutrino trail, and followed it to a human-colonized planet. As you know, it's almost certainly their own home world.

"If we bring back that information, there'll be no more trouble with the Adderkops. Not after the League sends in a few Star class battleships and threatens to bombard their planet. They realize as much. We were spotted; several warcraft jumped us; we were lucky enough to get away. Their ships are obsolete, and so far

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we've shown them a clean pair of heels. But I hardly think they've quit hunting for us. They'll send their entire fleet cruising in search. Hyperdrive vibrations transmit instantaneously, and can be detected up to about one light-year distance. So if any Adderkop picks up our 'wake' and homes in on it—with us crippled—that's the end."

She drew hard on her cigarette. "What are your plans?"

"A counter-move. Instead of trying to make Freya . . . uh . . . I mean, we're proceeding in a search-helix at medium speed, straining our own detectors. If we discover another ship, we'll use the last gasp of our engine to close in. If it's an Adderkop vessel, well, perhaps we can seize it or something; we do have a couple of light guns in our turrets. It may be a nonhuman craft, though. Our Intelligence reports, interrogation of prisoners, evaluation of explorers' observations, and so on, all indicate that three or four different species in this region possess the hyperdrive. The Adderkops themselves aren't certain about all of them. Space is so damned *huge*."

"If it does turn out to be nonhuman?"

"Then we'll do what seems indicated."

"I see." Her bright head nodded. She sat for a while, unspeaking, before she dazzled him with a smile. "Thanks, captain. You don't know how much you've helped me."

Torrance suppressed a foolish grin. "A pleasure, Freelady."

"I'm coming to Earth with you. Did you know that? Freeman van Rijn has promised me a very good job."

He always does, thought Torrance.

Jeri leaned closer. "I hope we'll have a chance on the Earthward trip to get better acquainted, captain. Or even right now."

The alarm bell chose that moment to ring.

The *Hebe G.B.* was a yacht, not a buccaneer frigate. When Nicholas van Rijn was aboard, though, the distinction sometimes got a little blurred. So she had more legs than most ships, detectors of uncommon sensitivity, and a crew experienced in the tactics of overhauling.

She was able to get a bearing on the hyper-emission of the other ship long before her own vibrations were observed. Pacing the unseen one, she established the set course it was following, then poured on all available juice to intercept. If the other had maintained quasivelocity, there would have been contact in three or four hours. Instead, its wake indicated a sheering off, an attempt to flee. The *Hebe G.B.* changed course too and continued gaining on her slower quarry.

"They're afraid of us," decided Torrance. "And they're not running back toward the Adderkop sun. Which two facts indicate they're not Adderkops themselves, but do have reason to be scared of strangers." He nodded, rather grimly, for during the

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preliminary investigations he had inspected a few backward planets which the bandit nation had visited.

Seeing that the pursuer kept shortening her distance, the pursued turned off their hyperdrive. Reverting to intrinsic sublight velocity, converter throttled down to minimal output, their ship became an infinitesimal speck in an effectively infinite space. The maneuver often works; after casting about futilely for a while, the enemy gives up and goes home. The *Hebe G.B.,* though, was prepared. The known superlight vector, together with the instant of cutoff, gave her computers a rough idea of where the prey was. She continued to that volume of space and then hopped about in a well-designed search pattern, reverting to normal state at intervals to sample the neutrino haze which any nuclear engine emits. Those nuclear engines known as stars provided most; but by statistical analysis, the computers presently isolated one feeble nearby source. The yacht went thither—and wan against the glittering sky, the other ship appeared in her screens.

It was several times her size, a cylinder with bluntly rounded nose and massive drive cones, numerous housings for auxiliary boats, a single gun turret. The principles of physics dictate that the general conformation of all ships intended for a given purpose shall be roughly the same. But any spaceman could see that this one had never been built by members of Technic civilization.

Fire blazed. Even with the automatic stopping-down of his viewscreen, Torrance was momentarily blinded. Instruments told him that the stranger had fired a fusion shell which his own robogunners had intercepted with a missile. The attack had been miserably slow and feeble. This was not a warcraft in any sense; it was no more a match for the *Hebe G.B.* than the yacht was for one of the Adderkops chasing her.

"Hokay, now we got that foolishness out of the way and we can talk business," said Van Rijn. "Get them on the telecom and develop a common language. Fast! Then explain we mean no harm but want just a lift to Valhalla." He hesitated before adding, with a distinct wince, "We can pay well."

"Might prove difficult, sir," said Torrance. "Our ship is identifiably human-built, but chances are that the only humans they've ever met are Adderkops."

"Well, so if it makes needful, we can board them and force them to transport us, *nie?* Hurry up, for Satan's sake! If we wait too long here, like behobbled snoozers, we'll get caught."

Torrance was about to point out they were safe enough. The Adderkops were far behind the swifter Terrestrial ship. They could have no idea that her hyperdrive was now cut off; when they began to suspect it, they could have no measurable probability of finding her. Then he remembered that the case was not so simple. If the parleying with these strangers took unduly long—more than a

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week, at best—Adderkop squadrons would have penetrated this general region and gone beyond. They would probably remain on picket for months: which the humans could not do, for lack of food. When a hyper-drive did start up, they'd detect it, and run down this awkward merchantman with ease. The only hope was to hitch a ride to Valhalla *soon,* using the head start already gained to offset the disadvantage of reduced speed.

"We're trying all bands, sir," he said. "No response so far." He frowned worriedly. "I don't understand. They must know we've got them cold, and they must have picked up our calls and realize we want to talk. Why don't they respond? Wouldn't cost them anything."

"Maybe they abandoned ship," suggested the communications officer. "They might have hyper-drive lifeboats."

"No." Torrance shook his head. "We'd have spotted that—Keep trying, Freeman Betancourt. If we haven't gotten an answer in an hour, we'll lay alongside and board."

The receiver screens remained blank. But at the end of the grace period, when Torrance was issuing space armor, Yamamura reported something new. Neutrino output had increased from a source near the stern of the alien. Some process involving moderate amounts of energy was being carried out.

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Torrance clamped down his helmet. "We'll have a look at that."

He posted a skeleton crew—Van Rijn himself, loudly protesting, took over the bridge—and led his boarding party to the main air lock. Smooth as a gliding shark—the old swine was a blue-ribbon spaceman after all, the captain realized in some astonishment—the *Hebe G.B.* clamped on a tractor beam and hauled herself toward the bigger vessel.

It disappeared. Recoil sent the yacht staggering.

"Beelzebub and botulism!" snarled van Rijn. "He went back into hyper, ha? We see about that!" The ulcerated converter shrieked as he called upon it; but the engines were given power. On a lung and a half, the Terrestrial ship again overtook the foreigner. Van Rijn phased in so casually that Torrance almost forgot this was a job considered difficult by master pilots. He evaded a frantic pressor beam and tied his yacht to the larger hull with unshearable bands of force. He cut off his hyperdrive again, for the converter couldn't take much more. Being within the force field of the alien, the *Hebe G.B.* was carried along, though the "drag" of extra mass reduced quasi-speed considerably. If he had hoped the grappled vessel would quit and revert to normal state, he was disappointed. The linked hulls continued plunging faster than light, toward an unnamed constellation.

Torrance bit back an oath, summoned his men, and went outside.

He had never forced entry on a hostile craft before, but assumed it wasn't much different from burning his way into a derelict. Having chosen his spot, he set up a balloon tent to conserve air; no use killing the alien crew. The torches of his men spewed flame, blue actinic sparks fountained backward and danced through zero gravity. Meanwhile the rest of the squad stood by with blasters and grenades.

Beyond, the curves of the two hulls dropped off to infinity. Without compensating electronic viewscreens, the sky was weirdly distorted by aberration and Doppler effect, as if the men were already dead and beating through the other existence toward Judgment. Torrance held his mind firmly to practical worries. Once inboard, the nonhumans made prisoner, how was he to communicate? Especially if he first had to gun down several of them—

The outer shell was peeled back. He studied the inner structure of the plate with fascination. He'd never seen anything like it before. Surely this race had developed space travel quite independently of mankind. Though their engineering must obey the same natural laws, it was radically different in detail. What was that tough but corky substance lining the inner shell? And was the circuitry embedded in it, for he didn't see any elsewhere?

The last defense gave way. Torrance swallowed hard and shot a flashbeam into the interior. Darkness

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and vacuum met him. When he entered the hull, he floated weightless; artificial gravity had been turned off. The crew was hiding some place and —

And—

Torrance returned to the yacht in an hour. When he came on the bridge, he found Van Rijn seated by Jeri. The girl started to speak, took a closer look at the captain's face, and clamped her teeth together.

"Well?" snapped the merchant peevishly.

Torrance cleared his throat. His voice sounded unfamiliar and far-away to him. "I think you'd better come have a look, sir."

"You found the crew, wherever the sputtering hell they holed up? What are they like? What kind of ship is this we've gotten us, ha?"

Torrance chose to answer the last question first. "It seems to be an interstellar animal collector's transport vessel. The main hold is full of cages —environmentally controlled compartments, I should say—with the damnedest assortment of creatures I've ever seen outside Luna City Zoo."

"So what is that to me? Where is the collector himself, and his fig-plucking friends?"

"Well, sir," Torrance gulped. "We're pretty sure by now, they're hiding from us. Among all the other animals."

A tube was run between the yacht's main lock and the entry cut in the other ship. Through this, air was pumped and electric lines were strung, to illuminate the prize. By some fancy juggling with the gravitic generator of the *Hebe G.B.*, Yamamura supplied about one-fourth Earth-weight to the foreigner, though he couldn't get the direction uniform and its decks felt canted in wildly varying degrees.

Even under such conditions, Van Rijn walked ponderously. He stood with a salami in one hand and a raw onion in the other, glaring around the captured bridge. It could only be that, though it was in the bows rather than the waist. The viewscreens were still in operation: smaller than human eyes found comfortable, but revealing the same pattern of stars, surely by the same kind of optical compensators. A control console made a semicircle at the forward bulkhead, too big for a solitary human to operate. Yet presumably the designer had only had one pilot in mind, for a single seat had been placed in the middle of the arc.

Had been. A short metal post rose from the deck. Similar structures stood at other points, and boltholes showed where chairs (?) were once fastened to them. But the seats had been removed.

"Pilot sat there at the center, I'd guess, when they weren't simply running on automatic," Torrance hazarded. "Navigator and communications officer . . . here and here? I'm not sure. Anyhow, they probably didn't use a copilot, but that chair bollard at the after end of the room suggests that an extra officer sat in

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reserve, ready to take over."

Van Rijn munched his onion and tugged his goatee. "Pestish big, this panel," he said. "Must be a race of bloody-be-damned octopuses, ha? Look how complicated."

He waved the salami around the half-circle. The console, which seemed to be of some fluorocarbon polymer, held very few switches or buttons, but scores of flat luminous plates, each about twenty centimeters square. Some of them were depressed. Evidently these were the controls. Cautious experiment had shown that a stiff push was needed to budge them. The experiment had ended then and there, for the ship's cargo lock had opened and a good deal of air was lost before Torrance slapped the plate he had been testing hard enough to make the hull reseal itself. One should not tinker with the atomic-powered unknown; most especially not in galactic space.

"They must be strong like horses, to steer by this system without getting exhausted," went on Van Rijn. "The size of everything tells likewise, *nie?*"

"Well, not exactly, sir," said Torrance. "The viewscreens seem made for dwarfs. The meters even more so." He pointed to a bank of instruments, no larger than buttons, on each of which a single number glowed. (Or letter, or odeogram, or what? They looked vaguely Old Chinese.) Occasionally a symbol changed value. "A human couldn't use these long without severe eyestrain. Of course, having eyes better adapted to close work than ours doesn't prove they are not giants. Certainly that switch couldn't be reached from here without long arms, and seems meant for big hands." By standing on tiptoe, he touched it himself: an outsize double-pole affair set overhead, just above the pilot's hypothetical seat.

The switch fell open.

A roar came from aft. Torrance lurched backward under a sudden force. He caught at a shelf on the after bulkhead to steady himself. Its thin metal buckled as he clutched. "Devilfish and dunderheads!" cried Van Rijn. Bracing his columnar legs, he reached up and shoved the switch back into position. The noise ended. Normality returned. Torrance hastened to the bridge doorway, a tall arch, and shouted down the corridor beyond: "It's O.K.! Don't worry! We've got it under control!"

"What the blue blinking blazes happened?" demanded Van Rijn, in somewhat more high-powered words.

Torrance mastered a slight case of the shakes. "Emergency switch, I'd say." His tone wavered. "Turns on the gravitic field full speed ahead, not wasting any force on acceleration compensators. Of course, we being in hyperdrive, it wasn't very effective. Only gave us a, uh, less than one-gee push, intrinsic. In normal state we'd have accelerated several gees, at least. It's for quick getaways and . . . and—"

"And you, with brains like fermented gravy and bananas for fin-

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gers, went ahead and yanked it open!"

Torrance felt himself redden. "How was I to know, sir? I must've applied less than half a kilo of force. Emergency switches aren't hair-triggered, after all! Considering how much it takes to move one of those control plates, who'd have thought the switch would respond to so little?"

Van Rijn took a closer look. "I see now there is a hook to secure it by," he said. "Must be they use that when the ship's on a high-gravity planet." He peered down a hole near the center of the panel, about one centimeter in diameter and fifteen deep. At the bottom a small key projected. "This must be another special control, ha? Safer than that switch. You would need thin-nosed pliers to make a turning of it." He scratched his pomaded curls. "But then why is not the plier's hanging handy? I don't see even a hook or bracket or drawer for them."

"I don't care," said Torrance. "When the whole interior's been stripped—There's nothing but a slag-heap in the engine room, I tell you, fused metal, carbonized plastic . . . bedding, furniture, anything they thought might give us a clue to their identity, all melted down in a jury-rigged cauldron. They used their own converter to supply heat. That was the cause of the neutrino flux Yamamura observed. They must have worked like demons."

"But they did not destroy all needful tools and machines, surely? Simpler then they should blow up their whole ship, and us with it. I was sweating like a hog, me, for fear they would do that. Not so good a way for a poor sinful old man to end his days, blown into radioactive stinks three hundred light-years from the vineyards of Earth."

"N-n-no. As far as we can tell from a cursory examination, they didn't sabotage anything absolutely vital. We can't be sure, of course. Yamamura's gang would need weeks just to get a general idea of how this ship is put together, let alone the practical details of operating it. But I agree, the crew isn't bent on suicide. They've got us more neatly trapped than they know, even. Bound helplessly through space—toward their home star, maybe—in any event, almost at right angles to the course we want."

Torrance led the way out. "Suppose we go have a more thorough look at the zoo, sir," he went on. "Yamamura talked about setting up some equipment . . . to help us tell the crew from the animals!"

The main hold comprised almost half the volume of the great ship. A corridor below, a catwalk above, ran through a double row of two-decker cubicles. These numbered ninety-six, and were identical. Each was about five meters on a side, with adjustable fluorescent plates in the ceiling and a springy, presumably inert plastic on the floor. Shelves and parallel bars ran along the side walls, for the benefit of animals which liked

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jumping or climbing. The rear wall was connected to well-shielded machines; Yamamura didn't dare tamper with these, but said they obviously regulated atmosphere, temperature, gravity, sanitation, and other environmental factors within each "cage." The front wall, facing on corridor and catwalk, was transparent. It held a stout air lock, almost as high as the cubicle itself, motorized but controlled by simple wheels inside and out. Only a few compartments were empty.

The humans had not strung fluoros in this hold, for it wasn't necessary. Torrance and Van Rijn walked through shadows, among monsters; the simulated light of a dozen different suns streamed around them, red, orange, yellow, greenish, and harsh electric blue.

A thing like a giant shark, save that tendrils fluttered about its head, swam in a waterfilled cubicle among fronded seaweeds. Next to it was a cageful of tiny flying reptiles, their scales aglitter in prismatic hues, weaving and dodging through the air. On the opposite side, four mammals crouched among yellow mists: beautiful creatures, the size of a bear, vividly tiger-striped, walking mostly on all fours but occasionally standing up; then you noticed the retractible claws between stubby fingers, and the carnivore jaws on the massive heads. Further on the humans passed half a dozen sleek red beasts like six-legged otters, frolicking in a tank of water provided for them. The environmental machines must have decided this was their feeding time, for a hopper spewed chunks of proteinaceous material into a trough and the animals lolloped over to rip it with their fangs.

"Automatic feeding," Torrance observed. "I think probably the food is synthesized on the spot, according to the specifications of each individual species as determined by biochemical methods. For the crew, also. At least, we haven't found anything like a galley."

Van Rijn shuddered. "Nothing but synthetics? Not even a little glass Genever before dinner?" He brightened. "Ha, maybe here we find a good new market. And until they learn the situation, we can charge them triple prices."

"First," clipped Torrance, "we've got to find them."

Yamamura stood near the middle of the hold, focusing a set of instruments on a certain cage. Jeri stood by, handing him what he asked for, plugging and unplugging at a small powerpack. Van Rijn hove into view. "What goes on, anyhows?" he asked.

The chief engineer turned a patient brown face to him. "I've got the rest of the crew examining the ship in detail, sir," he said. "I'll join them as soon as I've gotten Freelady Kofoed trained at this particular job. She can handle the routine of it while the rest of us use our special skills to —" His words trailed off. He grinned ruefully. "To poke and prod gizmos we can't possibly understand in less than a month of work, with our limited research tools."

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"A month we have not got," said Van Rijn. "You are here checking conditions inside each individual cage?"

"Yes, sir. They're metered, of course, but we can't read the meters, so we have to do the job ourselves. I've haywired this stuff together, to give an approximate value of gravity, atmospheric pressure and composition, temperature, illumination spectrum, and so forth. It's slow work, mostly because of all the arithmetic needed to turn the dial readings into such data. Luckily, we don't have to test every cubicle, or even most of them."

"No," said Van Rijn. "Even to a union organizer, obvious this ship was never made by fishes or birds. In fact, some kind of hands is always necessary."

"Or tentacles." Van Rijn nodded at the compartment before him. The light within was dim red. Several black creatures could be seen walking restlessly about. They had stumpy-legged quadrupedal bodies, from which torsos rose centaur fashion toward heads armored in some bony material. Below the faceless heads were six thick, ropy arms, set in triplets. Two of these ended in three boneless but probably strong fingers.

"I suspect these are our coy friends," said Yamamura. "If so, we'll have a deuce of a time. They breathe hydrogen under high pressure and triple gravity, at a temperature of seventy below."

"Are they the only ones who like that kind of weather?" asked Torrance.

Yamamura gave him a sharp look. "I see what you're getting at, skipper. No, they aren't. In the course of putting this apparatus together and testing it, I've already found three other cubicles where conditions are similar. And in those, the animals are obviously just animals: snakes and so on, which couldn't possibly have built this ship."

"But then these octopus-horses can't be the crew, can they?" asked Jeri timidly. "I mean, if the crew were collecting animals from other planets, they wouldn't take home animals along, would they?"

"They might," said Van Rijn. "We have a cat and a couple parrots aboard the *Hebe G.B., nie?* Or, there are many planets with very similar conditions of the hydrogen sort, just like Earth and Freya are much-alike oxygen planets. So that proves nothing." He turned toward Yamamura, rather like a rotating globe himself. "But see here, even if the crew did pump out all the air before we boarded, why not check their reserve tanks? If we find air stored away just like these diddlers here are breathing—"

"I thought of that," said Yamamura. "In fact, it was almost the first thing I told the men to look for. They've located nothing. I don't think they'll have any success, either. Because what they did find was an adjustable catalytic manifold. At least, it looks as if it should be, though we'd need days to find out

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for certain. Anyhow, my guess is that it renews exhausted air and acts as a chemosynthesizer to replace losses from a charge of simple inorganic compounds. The crew probably bled all the ship's air into space before we boarded. When we go away, if we do, they'll open the door of their particular cage a crack, so its air can trickle out. The environmental adjuster will automatically force the chemosynthesizer to replace this. Eventually the ship'll be full of enough of this kind of air for them to venture forth and adjust things more precisely." He shrugged. "That's assuming they even need to. Perhaps Earth-type conditions suit them perfectly well."

"Uh, yes," said Torrance. "Suppose we look around some more, and line up the possibly intelligent species."

Van Rijn trundled along with him. "What sort intelligence they got, these bespattered aliens?" he grumbled. "Why try this stupid masquerade in the first places?"

"It's not too stupid to have worked so far," said Torrance dryly. "We're being carried along on a ship we don't know how to stop. They must hope we'll either give up and depart, or else that we'll remain baffled until the ship enters their home region. At which time, quite probably a naval vessel—or whatever they've got—will detect us, close in, and board us to check up on what's happened."

He paused before a compartment. "I wonder—"

The quadruped within was the size of an elephant, though with a more slender build indicating a lower gravity than Earth's. Its skin was green and faintly scaled, a ruff of hair along the back. The eyes with which it looked out were alert and enigmatic. It had an elephantlike trunk, terminating in a ring of pseudodactyls which must be as strong and sensitive as human fingers.

"How much could a one-armed race accomplish?" mused Torrance. "About as much as we, I imagine, if not quite so easily. And sheer strength would compensate. That trunk could bend an iron bar."

Van Rijn grunted and went past a cubicle of feathered ungulates. He stopped before the next one. "Now here are some beasts might do," he said. "We had one like them on Earth once. What they called it? Quintilla? No, gorilla. Or chimpanzee, better, of gorilla size."

Torrance felt his heart thud. Two adjoining sections each held four animals of a kind which looked extremely hopeful. They were bipedal, short-legged and long-armed. Standing two meters tall, with a three-meter armspan, one of them could certainly operate that control console alone. The wrists, thick as a man's thighs, ended in proportionate hands, four-digited including a true thumb. The three-toed feet were specialized for walking, like man's feet. Their bodies were covered with brown fleece. Their heads were comparatively small, rising almost to a point, with massive snouts and beady

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eyes under cavernous brow ridges. As they wandered aimlessly about, Torrance saw that they were divided among males and females. On the sides of each neck he noticed two lumens closed by sphincters. The light upon them was the familiar yellowish-white of a Sol-type star.

He forced himself to say, "I'm not sure. Those huge jaws must demand corresponding maxillary muscles, attaching to a ridge on top of the skull. Which'd restrict the cranial capacity."

"Suppose they got brains in their bellies," said Van Rijn.

"Well, some people do," murmured Torrance. As the merchant choked, he added in haste, "No, actually, sir, that's hardly believable. Neural paths would get too long, and so forth. Every animal I know of, if it has a central nervous system at all, keeps the brain close to the principal sense organs: which are usually located in the head. To be sure, a relatively small brain, within limits, doesn't mean these creatures are not intelligent. Their neurones might well be more efficient than ours."

"Humph and hassenpfeffer!" said Van Rijn. "Might, might, might!" As they continued among strange shapes: "We can't go too much by atmosphere or light, either. If hiding, the crew could vary conditions quite a bit from their norm without hurting themselves. Gravity, too, by twenty or thirty per cent."

"I hope they breathe oxygen, though—Hoy!" Torrance stopped After a moment, he realized what was so eerie about the several forms under the orange glow. They were chitinous-armored, not much bigger than a squarish military helmet and about the same shape. Four stumpy legs projected from beneath to carry them awkwardly about on taloned feet; also a pair of short tentacles ending in a bush of cilia. There was nothing special about them, as extra-terrestrial animals go, except the two eyes which gazed from beneath each helmet: as large and somehow human as—well—the eyes of an octopus.

"Turtles," snorted Van Rijn. "Armadillos at most."

"There can't be any harm in letting Jer . . . Miss Kofoed check their environment too," said Torrance.

"It can waste time."

"I wonder what they eat. I don't see any mouths."

"Those tentacles look like capillary suckers. I bet they are parasites, or overgrown leeches, or something else like one of my competitors. Come along."

"What do we do after we've established which species could possibly be the crew?" aske Torrance. "Try to communicate with each in turn?"

"Not much use, that. They hide because they don't want to communicate. Unless we can prove to them we are not Adderkops—But hard to see how."

"Wait! Why'd they conceal themselves at all, if they've had contact with the Adderkops?"

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"I think I tell you that, by damn," said Van Rijn. "To give them a name, let us call this unknown race the Eksers. So. The Eksers been traveling space for some time, but space is so big they never bumped into humans. Then the Adderkop nation arises, in this sector where humans never was before. The Eksers hear about this awful new species which has gotten into space also. They land on primitive planets where Adderkops have made raids, talk to natives, maybe plant automatic cameras where they think raids will soon come, maybe spy on Adderkop camps from afar or capture a lone Adderkop ship. So they know what humans look like, but not much else. They do not want humans to know about them, so they shun contact; they are not looking for trouble. Not before they are all prepared to fight a war, at least. Hell's sputtering griddles! Torrance, we have *got* to establish our bona fides with this crew, so they take us to Freya and afterward go tell their leaders all humans are not so bad as the slime-begotten Adderkops. Otherwise, maybe we wake up one day with some planets attacked by Eksers, and before the fighting ends, we have spent billions of credits!" He shook his fists in the air and bellowed like a wounded bull. "It is our duty to prevent this!"

"Our first duty is to get home alive, I'd say," Torrance answered curtly. "I have a wife and kids."

"Then stop throwing sheepish eyes at Jeri Kofoed. I saw her first."

The search turned up one more possibility. Four organisms the length of a man and the build of thick-legged caterpillars dwelt under greenish light. Their bodies were dark blue, spotted with silver. A torso akin to that of the tentacled centauroids, but stockier, carried two true arms. The hands lacked thumbs, but six fingers arranged around a three-quarter circle could accomplish much the same thing.

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Not that adequate hands prove effective intelligence; on Earth, not only simians but a number of reptiles and amphibia boast as much, even if man has the best, and man's apish ancestors were as well-equipped in this respect as we are today. However, the round flat-faced heads of these beings, the large bright eyes beneath feathery antennae of obscure function, the small jaws and delicate lips, looked promising.

Promising of what? thought Torrance.

Three Earth-days later, he hurried down a central corridor toward the Ekser engine room.

The passage was a great hemicylinder lined with the same rubbery gray plastic as the cages, so that footfalls were silent and spoken words weirdly unresonant. But a deeper vibration went through it, the almost subliminal drone of the hyperengine, driving the ship into darkness, toward an unknown star, and announcing their presence to any hunter straying within a light-year of them. The fluoros strung by the humans were far apart, so that one passed through bands of humming shadow. Doorless rooms opened off the hallway. Some were still full of supplies, and however peculiar the shape of tools and containers might be, however unguessable their purpose, this was a reassurance that one still lived, not yet a ghost aboard the Flying Dutchman. Other cabins had been inhabited. And their bareness made Torrance's skin crawl.

Nowhere did a personal trace remain. Books, both folio and micro, survived, but in the finely printed symbology of a foreign planet. Empty places on the shelves suggested that all illustrated volumes had been sacrificed. Certainly one could see where pictures stuck on the walls had been ripped down. In the big private cabins, the still larger one which might have been a saloon, as well as in the engine room and workshop and bridge, only the bollards to which furniture had been bolted were left. Long low niches and small cubbyholes were built into the cabin bulkheads, but when all bedding had been thrown into a white-hot cauldron, how could one guess which were the bunks . . . if either kind were? Clothing, ornaments, cooking and eating utensils, everything was destroyed. One room must have been a lavatory, but all the facilities had been ripped out. Another might have been used for scientific studies, presumably of captured animals, but was so gutted that no human was certain.

You've got to admire them, Torrance thought. Captured by beings whom they had every reason to think of as conscienceless monsters, the aliens had not taken the easy way out, the atomic explosion that would annihilate both crews. They might have, except for the chance of this being a zoo ship. But given a hope of survival, they snatched it, with an imaginative daring few humans could have matched. Now they sat in plain view, waiting for the monsters

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to depart—without wrecking their ship in mere spitefulness—or for a naval vessel of their own to rescue them. They had no means of knowing their captors were not Adderkops, or that this sector would soon be filled with Adderkop squadrons; the vandits rarely ventured even this close to Valhalla. Within the limits of available information, the aliens were acting with complete logic. But the nerve it took!

I wish we could identify them and make friends, thought Torrance. *The Eksers would be good friends for Earth to have. Or Ramanujan, or Freya, or the entire Polesothechnic League.* With a lopsided grin: *I'll bet they'd be nowhere near as easy to swindle as Old Nick thinks. They might well swindle him. That I'd love to see!*

My reason is more personal, though, he thought with a return of bleakness. *If we don't clear up this misunderstanding soon, neither they nor we will be around. I mean soon. If we have another three or four days of grace, we're lucky.*

The passage opened on a well, with ramps curving down either side to a pair of automatic doors. One door led to the engine room, Torrance knew. Behind it, a nuclear converter powered the ship's electrical system, gravitic cones, and hyperdrive, and the principles on which this was done were familiar to him but the actual machines were enigmas cased in metal and in foreign symbols. He took the other door, which opened on a workshop. A good deal of the equipment here was identifiable, however distorted to his eyes: lathe, drill press, oscilloscope, crystal tester. Much else was mystery. Yamamura sat at an improvised workbench, fitting together a piece of electronic apparatus. Several other devices, haywired on headboards, stood close by. His face was shockingly haggard, and his hands trembled. He'd been working this whole time, with stimpills to keep him awake.

As Torrance approached, the engineer was talking with Betancourt, the communications man. The entire crew of the *Hebe G.B.* were under Yamamura's direction, in a frantic attempt to outflank the Eksers by learning on their own how to operate this ship.

"I've identified the basic electrical arrangement, sir," Betancourt was saying. "They don't tap the converter directly, like us; so evidently they haven't developed our stepdown methods. Instead, they use a heat exchanger to run an extremely large generator—yeah, the same thing you guessed was an armature-type dynamo—and draw A.C. for the ship off that. Where D.C. is needed, the A.C. passes through a set of rectifier plates which, by looking at 'em, I'm sure must be copper oxide. They're bare, behind a safety screen, though so much current goes through that they're too hot to look at close up. It all seems kind of primitive to me."

"Or else merely different," sighed Yamamura. "We use a light-element-

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fusion converter, one of whose advantages is that it can develop electric current directly. They may have perfected a power plant which utilizes moderately heavy elements with small positive packing fractions. I remember that was tried on Earth a long while ago, and given up as impractical. But maybe the Eksers are better engineers than us. Such a system would have the advantage of needing less refinement of fuel—which'd be a real advantage to a ship knocking about among unexplored planets. Maybe enough to justify that clumsy heat exchanger and rectifier system. We simply don't know."

He stared head-shakingly at the wires he was soldering. "We don't know a thing," he said. Seeing Torrance: "Well, carry on, Freeman Betancourt. And remember, *festina lente.*"

"For fear of wrecking the ship?" asked the captain.

Yamamura nodded. "The Eksers would've known a small craft like ours couldn't generate a big enough hyperforce field to tug their own ship home," he replied. "So they'll have made sure no prize crew could make off with it. Some of the stuff may be booby-trapped to wreck itself if it isn't handled just so; and how'd we ever make repairs? Hence we're proceeding with the utmost caution. So cautiously that we haven't a prayer of figuring out the controls before the Adderkops find us."

"It keeps the crew busy, though."

"Which is useful. Uh-huh. Well, sir, I've about got my basic apparatus set up. Everything seems to test O.K. Now let me know which animal you want to investigate first." As Torrance hesitated, the engineer explained: "I have to adapt the equipment for the creature in question, you see. Especially if it's a hydrogen breather."

Torrance shook his head. "Oxygen. In fact, they live under conditions so much like ours that we can walk right into their cages. The gorilloids. That's what Jeri and I have named them. Those woolly, two-meter-tall bipeds with the ape faces."

Yamamura made an ape face of his own. Brutes that powerful? Have they shown any sign of intelligence?"

"No. But then, would you expect the Eksers to do so? Jeri Kofoed and I have been parading in front of the cages of all the possible species, making signs, drawing pictures, everything we could think of, trying to get the message across that we are not Adderkops and the genuine article is chasing us. No luck, of course. All the animals did give us an interested regard except the gorilloids . . . which may or may not prove anything."

"What animals, now? I've been so blinking busy—"

"Well, we call 'em the tiger apes, the tentacle centaurs, the elephantoid, the helmet beasts, and the caterpiggles. That's stretching things, I know; the tiger apes and the helmet beasts are highly improbable, to say the least, and the elephantoid isn't

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much more convincing. The gorilloids have the right size and the most efficient-looking hands, and they're oxygen breathers as I said, so we may as well take them first. Next in order of likelihood, I'd guess, are the caterpiggles and the tentacle centaurs. But the caterpiggles, though oxygen breathers, are from a high-gravity planet; their air pressure would give us narcosis in no time. The tentacle centaurs breathe hydrogen. In either case, we'd have to work in space armor."

"The gorilloids will be quite bad enough, thank you kindly!"

Torrance looked at the workbench. "What exactly do you plan to do?" he asked. "I've been too busy with my own end of this affair to learn any details of yours."

"I've adapted some things from the medical kit," said Yamamura. "A sort of ophthalmoscope, for example; because the ship's instruments use color codes and finely printed symbols, so that the Eksers are bound to have eyes at least as good as ours. Then this here's a nervous-impulse tracer. It detects synaptic flows and casts a three-dimensional image into yonder crystal box, so we can see the whole nervous system functioning as a set of luminous traces. By correlating this with gross anatomy, we can roughly identify the sympathetic and parasympathetic systems—or their equivalents—I hope. And the brain. And, what's really to the point, the degree of brain activity more or less independent of the other nerve paths. That is, whether the animal is thinking."

He shrugged. "It tests out fine on me. Whether it'll work on a nonhuman, especially in a different sort of atmosphere, I do not know. I'm sure it'll develop bugs."

"'We can but try,'" quoted Torrance wearily.

"I suppose Old Nick is sitting and thinking," said Yamamura in an edged voice. "I haven't seen him for quite some time."

"He's not been helping Jeri and me either," said Torrance. "Told us our attempt to communicate was futile until we could prove to the Eksers that we knew who they were. And even after that, he said, the only communication first will be by gesture made with a pistol."

"He's probably right."

"He's not right! Logically, perhaps, but not psychologically. Or morally. He sits in his suite with a case of brandy and a box of cigars. The cook, who could be down here helping you, is kept aboard the yacht to fix him his gourmet meals. You'd think he didn't care if we're blown out of the sky!!"

He remembered his oath of fealty, his official position, and so on and so on. They seemed nonsensical enough, here on the edge of extinction. But habit was strong. He swallowed and said harshly: "Sorry. Please ignore what I said. When you're ready, Freeman Yamamura, we'll test the gorilloids."

Six men and Jeri stood by in the passage with drawn blasters. Tor-

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rance hoped fervently they wouldn't have to shoot. He hoped even more that if they did have to, he'd still be alive.

He gestured to the four crewmen at his back. "O.K., boys." He wet his lips. His heart thuttered. Being a captain and a Lodgemaster was very fine until moments like this came, when you must make a return for all your special privileges.

He spun the outside control wheel. The air-lock motor hummed and opened the doors. He stepped through, into a cage of gorilloids.

Pressure differentials weren't enough to worry about, but after all this time at one-fourth gee, to enter a field only ten per cent less than Earth's was like a blow. He lurched, almost fell, gasped in an air warm and thick and full of unnamed stenches. Sagging back against the wall, he stared across the floor at the four bipeds. Their brown fleecy bodies loomed unfairly tall, up and up to the broad coarse faces. Eyes overshadowed by brows glared at him. He clapped a hand on his stun pistol. He didn't want to shoot it, either. No telling what supersonics might do to a nonhuman nervous system; and if these were in truth the crewfolk, the worst thing he could do was inflict serious injury on one of them. But he wasn't used to being small and frail. The knurled handgrip was a comfort.

A male growled, deep in his chest, and advanced a step. His pointed head thrust forward, the sphincters in his neck opened and shut like sucking mouths, his jaws gaped to show the white teeth.

Torrance backed toward a corner. "I'll try to attract that one in the lead away from the others," he called softly. "Then get him."

"Aye." A spacehand, a stocky slant-eyed nomad from Altai uncoiled a lariat. Behind him, the other three spread a net woven for this purpose.

The gorilloid paused. A female hooted. The male seemed to draw resolution from her. He waved the others back with a strangely humanlike gesture and stalked toward Torrance.

The captain drew his stunner, pointed it shakily, resheathed it and held out both hands. "Friend," he croaked.

His hope that the masquerade might be dropped became suddenly ridiculous. He sprang back toward the air lock. The gorilloid snarled and snatched at him. Torrance wasn't fast enough. The hand ripped his shirt open and left a bloody trail on his chest. He went to hands and knees, stabbed with pain. The Altaian's lasso whirled and snaked forth. Caught around the ankles, the gorilloid crashed. His weight shook the cubicle.

"Get him! Watch out for his arms! Here—"

Torrance staggered back to his feet. Beyond the melee, where four men strove to wind a roaring, struggling monster in a net, he saw the other three creatures. They were crowded into the opposite corner,

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howling in basso. The compartment was like the inside of a drum.

"Get him out," choked Torrance. "Before the others charge."

He aimed his stunner again. If intelligent, they'd know this was a weapon. They might attack anyway . . . Deftly, the man from Alta roped an arm, snubbed his lariat around the gargantuan torso, and made it fast by a slip knot. The net came into position. Helpless in cords of wire-strong fiber, the gorilloid was dragged to the entrance. Another male advanced, step by jerky step. Torrance stood his ground. The animal ululation and human shouting surfed about him, within him. His wound throbbed. He saw with unnatural clarity: the muzzle full of teeth that could snap his head off, the little dull eyes turned red with fury, the hands so much like his own but black-skinned, four-fingered, and enormous—

"All clear, skipper!"

The gorilloid lunged. Torrance scrambled through the air lock chamber. The giant followed. Torrance braced himself in the corridor and aimed his stun pistol. The gorilloid halted, shivered, looked around in something resembling bewilderment, and retreated. Torrance closed the air lock.

Then he sat down and trembled.

Jeri bent over him. "Are you all right?" she breathed. "Oh! You've been hurt!"

"Nothing much," he mumbled. "Gimme a cigarette."

She took one from her belt pouch and said with a crispness he admired, "I suppose it is just a bruise and a deep scratch. But we'd better check it anyway, and sterilize. Might be infected."

He nodded but remained where he was until he had finished the cigarette. Farther down the corridor, Yamamura's men got their captive secured to a steel framework. Unharmed but helpless, the brute yelped and tried to bite as the engineer approached with his equipment. Returning him to the cubicle afterward was likely to be almost as tough as getting him out.

Torrance rose. Through the transparent wall, he saw a female gorilloid viciously pulling something to shreds, and realized he had lost his turban when he was knocked over. He sighed. "Nothing much we can do till Yamamura gives us a verdict," he said. "Come on, let's go rest a while."

"Sickbay first," said Jeri firmly. She took his arm. They went to the entryhole, through the tube, and into the steady half-weight of the *Hebe G.B.* which Van Rijn preferred. Little was said while Jeri got Torrance's shirt off, swabbed the wound with universal disinfectant, which stung like hell, and bandaged it. Afterward he suggested a drink.

They entered the saloon. To their surprise, and to Torrance's displeasure, Van Rijn was there. He sat at the inlaid mahogany table, dressed in snuff-stained lace and his usual sarong, a bottle in one hand and a

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Trichinopoly cigar in the other. A litter of papers lay before him.

"Ah, so," he said, glancing up. "What gives?"

"They're testing a gorilloid now." Torrance flung himself into a chair. Since the steward had been drafted for the capture party, Jeri went after drinks. Her voice floated back, defiant:

"Captain Torrance was almost killed in the process. Couldn't you at least come watch, Nick?"

"What use I should watch, like some tourist with haddock eyes?" scoffed the merchant. "I make no skeletons about it, I am too old and fat to help chase large economy-size apes. Nor am I so technical I can twiddle knobs for Yamamura." He took a puff of his cigar and added complacently, "Besides, that is not my job. I am no kind of specialist, I have no fine university degrees, I learned in the school of hard knockers. But what I learned is how to make men do things for me, and then how to make something profitable from all their doings."

Torrance breathed out, long and slow. With the tension eased, he was beginning to feel immensely tired. "What're you checking over?" he asked.

"Reports of engineer studies on the Ekser ship," said Van Rijn. "I told everybody should take full notes on what they observed. Somewhere in those notes is maybe a clue we can use. If the gorilloids are not the Eksers, I mean. The gorilloids are possible, and I see no way to eliminate them except by Yamamura's checkers."

Torrance rubbed his eyes. "They're not entirely plausible," he said. "Most of the stuff we've found seems meant for big hands. But some of the tools, especially, are so small that—Oh, well, I suppose a nonhuman might be as puzzled by an assortment of our own tools. Does it really make sense that the same race would use sledge hammers and etching needles?"

Jeri came back with two stiff Scotch-and-sodas. His gaze followed her. In a tight blouse and half knee-length skirt, she was worth following. She sat down next to him rather than to Van Rijn, whose jet eyes narrowed.

However, the older man spoke mildly: "I would like if you should list for me, here and now, the other possibilities, with your reasons for thinking of them. I have seen them too, natural, but my own ideas are not all clear yet and maybe something that occurs to you would joggle my head."

Torrance nodded. One might as well talk shop, even though he'd been over this ground a dozen times before with Jeri and Yamamura.

"Well," he said, "the tentacle centaurs appear very likely. You know the ones I mean. They live under red light and about half again Earth's gravity. A dim sun and a low temperature must make it possible for their planet to retain hydrogen, because that's what they breathe, hydro-

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gen and argon. You know how they look: bodies sort of like rhinoceri, torsos with bone-plated heads and fingered tentacles. Like the gorilloids, they're big enough to pilot this ship easily.

"All the others are oxygen breathers. The ones we call caterpiggles—the long, many-legged, blue-and-silver ones, with the peculiar hands and the particularly intelligent-looking faces—they're from an oddball world. It must be big. They're under three gees in their cage, which can't be a red herring for this length of time. Body fluid adjustment would go out of kilter, if they're used to much lower weight. Even so, their planet has oxygen and nitrogen rather than hydrogen, under a dozen Earth-atmospheres' pressure. The temperature is rather high, fifty degrees. I imagine their world, though of nearly Jovian mass, is so close to its sun that the hydrogen was boiled off, leaving a clear field for evolution similar to Earth's.

"The elephantoid comes from a planet with only about half our gravity. He's the single big fellow with a trunk ending in fingers. He gets by in air too thin for us, which indicates the gravity in his cubicle isn't faked either."

Torrance took a long drink. "The rest all live under pretty terrestroid conditions," he resumed. "For that reason, I wish they were more probable. But actually, except the gorilloids, they seem like long shots. The helmet beasts—"

"What's that?" asked Van Rijn.

"Oh, you remember," said Jeri. "Those eight or nine things like humpbacked turtles, not much bigger than your head. They crawl around on clawed feet, waving little tentacles that end in filaments. They blot up food through those: soupy stuff the machines dump into their trough. They haven't anything like effective hands—the tentacles could only do a few very simple things—but we gave them some time because they do seem to have better developed eyes than parasites usually do."

"Parasites don't evolve intelligence," said Van Rijn. "They got better ways to make a living, by damn. Better make sure the helmet beasts really are parasites—in their home environments—and got no hands tucked under those shells—before you quite write them off. Who else you got?"

"The tiger apes," said Torrance. "Those striped carnivores built something like bears. They spend most of their time on all fours, but they do stand up and walk on their hind legs sometimes, and they do have hands. Clumsy, thumbless ones, with retractable claws, but on all their limbs. Are four hands without thumbs as good as two with? I don't know. I'm too tired to think."

"And that's all, ha?" Van Rijn tilted the bottle to his lips. After a prolonged gurgling he set it down, belched, and blew smoke through his majestic nose. "Who's to try next, if the gorilloids flunk?"

"It better be the caterpiggles, in spite of the air pressure," said Jeri.

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"Then . . . oh . . . the tentacle centaurs, I suppose. Then maybe the—"

"Horse maneuvers!" Van Rijn's fist struck the table. The bottle and glasses jumped. "How long it takes to catch and check each one? Hours, *nie?* And in between times, takes many more hours to adjust the apparatus and chase out all the hiccups it develops under a new set of conditions. Also, Yamamura will collapse if he can't sleep soon, and who else we got can do this? All the whiles, the forstunken Adderkops get closer. We have not got time for that method! If the gorilloids don't fan out, then only logic will help us. We must deduce from the facts

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we have, who the Eksers are."

"Go ahead." Torrance drained his glass. "I'm going to take a nap."

Van Rijn purpled. "That's right!" he huffed. "Be like everybody elses. Loaf and play, dance and sing, enjoy yourselves the liver-long day. Because you always got poor old Nicholas Van Rijn there, to heap the work and worry on his back. Oh, dear St. Dismas, why can't you at least make some *one* other person in this whole universe do something useful?"

Torrance was awakened by Yamamura. The gorilloids were not the Eksers. They were color-blind and incapable of focusing on the ship's instruments; their brains were small, with nearly the whole mass devoted to purely animal functions. He estimated their intelligence as equal to a dog's.

The captain stood on the bridge of the yacht, because it was a familiar place, and tried to accustom himself to being doomed.

Space had never seemed so beautiful as now. He was not well acquainted with the local constellations, but his trained gaze identified Perseus, Auriga, Taurus, not much distorted since they lay in the direction of Earth. (And of Ramanujan, where gilt towers rose out of mists to catch the first sunlight, blinding against blue Mount Gandhi.) A few individuals could also be picked out, ruby Betelgeuse, amber Spica, the pilot stars by which he had steered through his whole working life. Otherwise the sky was aswarm with small frosty fires, across blackness unclouded and endless. The Milky Way girdled it with cool silver, a nebula glowed faint and green, another galaxy spiraled on the mysterious edge of visibility. He thought less about the planets he had trod, even his own, than about this faring between them which was soon to terminate. For end it would, in a burst of violence too swift to be felt. Better go out thus cleanly when the Adderkops came, than into their dungeons.

He stubbed out his cigarette. Returning, his hand caressed the dear shapes of controls. He knew each switch and knob as well as he knew his own fingers. This ship was his; in a way, himself. Not like that other, its senseless control board which needed a giant and a dwarf, whose emergency switch fell under a mere slap if it wasn't hooked in place, whose—

A light footfall brought him twisting around. Irrationally, so strained was he, his heart flew up within him. When he saw it was Jeri, he eased his muscles, but the pulse continued quick in his blood.

She advanced slowly. The overhead light gleamed on her yellow hair and in the blue of her eyes. But she avoided his glance and her mouth was not quite steady.

"What brings you here?" he asked. His tone fell even more soft than he had intended.

"Oh . . . the same as you." She

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stared out the viewscreen. During the time since they captured the alien ship, or it captured them, a red star off the port bow had visibly grown. Now it burned baleful as they passed, a light-year distant. She grimaced and turned her back to it. "Yamamura is readjusting the test apparatus," she said thinly. "No one else knows enough about it to help him, but he has the shakes so bad from exhaustion he can scarcely do the job himself.

Old Nick just sits in his suite, smoking and drinking. He's gone through one bottle already, and has now started on another. I couldn't breathe in there any longer, it was so smoky. And he won't say a word. Except to himself, in Malay or something. I couldn't stand it."

"We may as well wait," said Torrance. "We've done everything we can, till it's time to check a caterpiggle. We'll have to do that space-suited, in their own cage, and hope they don't all attack us."

She slumped. "Why bother?" she said. "I know the situation as well as you. Even if the caterpiggles are the Eksers, under those conditions we'll need a couple of days to prove it. I doubt if we have that much time left. If we start toward Valhalla two days from now, I'll bet we're detected and run down before we get there. Certainly, if the caterpiggles are only animals too, we'll never get time to test a third species. Why bother?"

"We've nothing else to do," said Torrance.

"Yes, we do. Not this ugly, futile squirming about, like cornered rats. Why can't we accept that we're going to die, and use the time to . . . to be human again?"

Startled, he looked back from the sky to her. "What do you mean?"

Her lashes fluttered downward. "I suppose that would depend on what we each prefer. Maybe you'd want to, well, get your thoughts in order or something."

"How about you?" he asked through his heartbeat.

"I'm not a thinker," she smiled forlornly. "I'm afraid I'm just a shallow sort of person. I'd like to enjoy life while I have it." She half turned from him. "But I can't find anyone I'd like to enjoy it with."

He, or his hands, grabbed her bare shoulders and spun her around to face him. She felt silken under his palms. "Are you sure you can't?" he said roughly. She closed her eyes and stood with face tilted upward, lips half parted. He kissed her. After a second she responded.

After a minute, Nicholas Van Rijn appeared in the doorway.

He stood an instant, pipe in hand, gun belted to his waist, before he flung the churchwarden shattering to the deck. "So!" he bellowed.

"Oh!" wailed Jeri.

She disengaged herself. A tide of rage mounted in Torrance. He knotted his fists and started toward Van Rijn.

"So!" repeated the merchant. The bulkheads seemed to quiver with his voice. "By louse-bitten damn, this is

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a fine thing for me to come on. Satan's tail in a mousetrap! I sit hour by hour sweating my brain to the bone for the sake of your worthless life, and all whiles you, you illegitimate spawn of a snake with dandruff and a cheese mite, here you are making up to my own secretary hired with my own hard-earned money! Gargoyles and Götterdammerung! Down on your knees and beg my pardon, or I mash you up and sell you for dogfood!"

Torrance stopped, a few centimeters from Van Rijn. He was slightly taller than the merchant, if less bulky, and at least thirty years younger. "Get out," he said in a strangled voice.

Van Rijn turned puce and gobbled at him.

"Get out," repeated Torrance. "I'm still the captain of this ship. I'll do what I please, without interference from any loud-mouthed parasite. Get off the bridge or I'll toss you out on your fat bottom!"

The color faded in Van Rijn's cheeks. He stood motionless for whole seconds. "Well, by damn," he whispered at last. "By damn and death, cubical. He has got the nerve to talk back."

His left fist came about in a roundhouse swing. Torrance blocked it, though the force nearly threw him off his feet. His own left smacked the merchant's stomach, sank a short ways into fat, encountered the muscles, and rebounded bruised. Then Van Rijn's right fist clopped. The cosmos exploded around Torrance. He flew up in the air, went over backward, and lay where he fell.

When awareness returned, Van Rijn was cradling his head and offering brandy which a tearful Jeri had fetched. "Here, boy. Go slow there. A little nip of this, ha? That goes good. There, now, you only lost one tooth and we get that fixed at Freya. You can even put it on expense account. There, that makes you feel more happy, *nie?* Now, girl, Jarry, Jelly, whatever your name is, give me that stimpill. Down the hatchworks, boy. And then, upsy-rosy, onto your feet. You should not miss the fun."

One-handed, Van Rijn heaved Torrance erect. The captain leaned a while on the merchant, until the stimpill removed aches and dizziness. Then, huskily through swollen lips, he asked, "What's going on? What d' you mean?"

"Why, I know who the Eksers are. I came to get you, and we fetch them from their cage." Van Rijn nudged Torrance with a great splay thumb and whispered almost as softly as a hurricane: "Don't tell anyone or I have too many fights, but I like a brass-bound nerve like you got. When we get home, I think you transfer off this yacht to command of a trading squadron. How you like that, ha? But come, we still got a damn plenty of work to do."

Torrance followed him in a daze: through the small ship and the tube, into the alien, down a corridor and a ramp to the zoological hold. Van Rign gestured at the spacemen post-

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ed on guard lest the Eksers make a sally. They drew their guns and joined him, their weary slouch jerking to alertness when he stopped before an air lock.

"Those?" sputtered Torrance. "But . . . I thought—"

"You thought what they hoped you would think," said Van Rijn grandly. "The scheme was good. Might have worked, not counting the Adderkops, except that Nicholas Van Rijn was here. Now, then. We go in and take them all out, making a good show of our weapons. I hope we need not get too tough with them. I expect not, when we explain by drawings how we understand all their secret. Then they should take us to Valhalla, as we can show by those pretty astronautical diagrams Captain Torrance has already prepared. They will co-operate under threats, as prisoners, at first. But on the voyage, we can use the standard means to establish alimentary communications . . . no, terror and taxes, I mean rudimentary . . . anyhows, we get the idea across that all humans are not Adderkops and we want to be friends and sell them things. Hokay? We go!"

He marched through the air lock, scooped up a helmet beast, and bore it kicking out of its cage.

Torrance didn't have time for anything en route except his work. First the entryhole in the prize must be sealed, while supplies and equipment were carried over from the *Hebe G.B.* Then the yacht must be cast loose under her own hyperdrive; in the few hours before her converter quite burned out, she might draw an Adderkop in chase. Then the journey commenced, and though the Eksers laid a course as directed, they must be constantly watched lest they try some suicidal stunt. Every spare moment must be devoted to the urgent business of achieving a simple common language with them. Torrance must also supervise his crew, calm their fears, and maintain a detector-watch for enemy vessels. If any had been detected, the humans would have gone off hyperdrive and hoped they could lie low. None were, but the strain was considerable.

Occasionally he slept.

Thus he got no chance to talk to Van Rijn at length. He assumed the merchant had had a lucky hunch, and let it go at that.

Until Valhalla was a tiny yellow disk, outshining all other stars; and a League patrol ship closed on them; and, explanations being made, it gave them escort as they moved at sublight speed toward Freya.

The patrol captain intimated he'd like to come aboard. Torrance stalled him. "When we're in orbit, Freeman Agilik, I'll be delighted. But right now, things are pretty disorganized. You can understand that, I'm sure."

He switched off the alien telecom he had now learned to operate. "I'd better go below and clean up," he said. "Haven't had a bath since we abandoned the yacht. Carry on, Freeman Lafarge." He hesitated. "And, uh, Freeman Jukh-Barklakh."

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Jukh grunted something. The gorilloid was too busy to talk, squatting where a pilot seat should have been, his big hands slapping control plates as he edged the ship into a hyperbolic path. Barklakh, the helmet beast on his shoulders, who had no vocal cords of his own, waved a tentacle before he dipped it into the protective shaftlet to turn a delicate adjustment key. The other tentacle remained buried on its side of the gorilloid's massive neck, drawing nourishment from the bloodstream, receiving sensory impulses, and emitting the motor-nerve commands of a skilled space pilot.

At first the arrangement had looked vampirish to Torrance. But though the ancestors of the helmet beasts might once have been parasites on the ancestors of the gorilloids, they were so no longer. They were symbiotes. They supplied the effective eyes and intellect, while the big animals supplied strength and hands. Neither species was good for much without the other; in combination, they were something rather special. Once he got used to the idea, Torrance found the sight of a helmet beast using its claws to climb up a gorilloid no more unpleasant than a man in a historical stereopic mounting a horse. And once the helmet beasts were used to the idea that not all humans were enemies, they showed a positive affection for them.

Doubtless they're thinking what lovely new specimens we can sell them for their zoo, reflected Torrance. He slapped Barklakh on the shell, patted Jukh's fur, and left the bridge.

A sponge bath of sorts and fresh garments took the edge off his weariness. He thought he'd better warn Van Rijn, and knocked at the cabin which the merchant had curtained off as his own.

"Come in," boomed the bass voice. Torrance entered a cubicle blue with smoke. Van Rijn sat on an empty brandy case, one hand holding a cigar, the other holding Jeri, who was smuggled on his lap.

"Well, sit down, sit down," he roared cordially. "You find a bottle somewhere in all those dirty clothes in the corner."

"I stopped by to tell you, sir, we'll have to receive the captain of our escort when we're in orbit around Freya, which'll be soon. Professional courtesy, you know. He's naturally anxious to meet the Eks . . . uh . . . the Togru-Kon-Tanakh."

"Hokay, pipe him aboard, lad," Van Rijn scowled. "Only make him bring his own bottle, and not take too long. I want to land, me, I'm sick of space. I think I'll run barefoot over the soft cool acres and acres of Freya, by damn!"

"Maybe you'd like to change clothes?" hinted Torrance.

"Ooh!" squeaked Jeri, and ran off to the cabin she sometimes occupied. Van Rijn leaned back against the wall, hitched up his sarong and crossed his shaggy legs as he said: "If that captain comes to meet the Eksers, so let him meet the Eksers.

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I stay comfortable like I am. And I will not entertain him with how I figured out who they were. That I keep exclusive, for sale to what news syndicate bids highest. Understand?"

His eyes grew unsettlingly sharp. Torrance gulped. "Yes, sir."

"Good. Now do sit down, boy. Help me put my story in order. I have not your fine education, I was a poor lonely hard-working old man from I was twelve, so I would need some help making my words as elegant as my logic."

"Logic?" echoed Torrance, puzzled. He tilted the bottle, chiefly because the tobacco haze in here made his eyes smart. "I thought you guessed —"

"What? You know me so little as that? No, no, by damn. Nicholas Van Rijn never guesses. I *knew*." He reached for the bottle, took a hefty swig, and added magnanimously, "That is, after Yamamura found the gorilloids alone could not be the people we wanted. Then I sat down and uncluttered my brains and thought it all over.

"See, it was simple eliminations. The elephantoid was out right away. Only one of him. Maybe, in emergency, one could pilot this ship through space—but not land it, and pick up wild animals, and care for them, and all else. Also, if somethings go wrong, he is helpless."

Torrance nodded. "I did consider it from the spaceman's angle," he said. "I was inclined to rule out the elephantoid on that ground. But I admit I didn't see the animal-collecting aspect made it altogether impossible that this could be a one-being expedition."

"He was pretty too big anyhow," said Van Rijn. "As for the tiger apes, like you, I never took them serious. Maybe their ancestors was smaller and more biped, but this species is reverting to quadruped again. Animals do not specialize in being everything. Not brains and size and carnivore teeth and cat claws, all to once.

"The caterpiggles looked hokay till I remembered that time you accidental turned on the bestonkered emergency acceleration switch. Unless hooked in place, what such a switch would not be except in special cases, it fell rather easy. So easy that its own weight would make it drop open under three Earth gravities. Or at least there would always be serious danger of this. Also, that shelf you bumped into, they wouldn't build shelves so light on high-gravity planets."

He puffed his cigar back to furnace heat. "Well, so might be the tentacle centaurs," he continued. "Which was bad for us, because hydrogen and oxygen explode. I checked hard through the reports on the ship, hoping I could find something that would eliminate them. And by damn, I did. For this I will give St. Dismas an altar cloth, not too expensive. You see, the Eksers is kind enough to us copper oxide rectifiers, exposed to the air. Copper oxide and hydrogen, at a not very high temperature such as would soon develop from

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strong electricking, they make water and pure copper. Poof, no more rectifier. So therefore ergo, this ship was not designed for hydrogen breathers." He grinned. "You has had so much high scientific education you forgot your freshlyman chemistry."

Torrance snapped his fingers and swore at himself.

"By eliminating, we had the helmet beasts," said Van Rijn. "Only they could not possible be the builders. True, they could handle certain tools and controls, like that buried key; but never all of it. And they are so slow and small. How could they ever stayed alive long enough to invent spaceships? Also, animals that little don't got room for real brains. And neither armored animals nor parasites ever get much. Nor do they get good eyes. And yet the helmet beasts seemed to have very good eyes, as near as we could tell. They looked like human eyes, anyhows.

"I remembered there was both big and little cubbyholes in these cabins. Maybe bunks for two kinds of sleeper? And I thought, is the human brain a turtle just because it is armored in bone? A parasite just because it lives off blood from other places? Well, maybe some people I could name but won't, like Juan Harleman of the Venusian Tea & Coffee Growers, Inc., has parasite turtles for brains. But not me. So there I was. Q.," said Van Rijn smugly, "E.D."

Hoarse from talking, he picked up the bottle. Torrance sat a few minutes more, but as the other seemed disinclined to conversation, he got up to go.

Jeri met him in the doorway. In a slit and topless blue gown which fitted like a coat of lacquer, she was a fourth-order stunblast. Torrance stopped in his tracks. Her gaze slid slowly across him, as if reluctant to depart.

"Mutant sea otter coats," murmured Van Rijn dreamily. "Martian firegems. An apartment in the Stellar Towers."

She scampered to him and ran her fingers through his hair. "Are you comfortable, Nicky?" she purred. "Can't I do something for you?"

Van Rijn winked at Torrance. "Your technique, that time on the bridge, I watched and it was lousy," he said. "Also, you are not old and fat and lonesome; you have a happy family for yourself."

"Uh, yes," said Torrance. "I do." He let the curtain drop and returned to the bridge.

THE END

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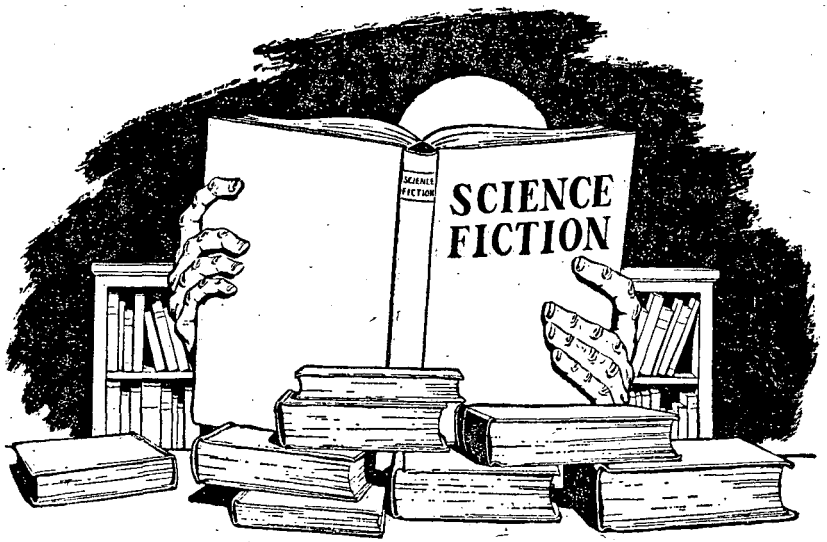

BY P. SCHUYLER MILLER

TOMORROWS

IT APPEARS that American newspapers are not the only ones to offer their readers periodic views of the world of tomorrow, as seen by scientists of note. The Soviet youth journal, *Komsomolskaya Pravda,* assigned two of its reporters, Sergei Gouschev and the same Mikhail Vassiliev whose "Sputnik into Space" we have already seen here, to interview twenty-nine top Russian scientists and engineers and get their predictions of the technological world of the 21st century. McGraw-Hill is publishing the American edition of their book as "Russian Science in the 21st Century"—222 pp.; $4.50.

The translation is again an English one—English and Canadian editions have already appeared—and I'd say it is again by academic people who don't understand science of scientific terms. The confusion isn't compounded as it was in Vassiliev's "Sputnik," but the jargon does get

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dense in spots and rather hard to plow through.

As a matter of fact, the entire book sounds like something halfway between an *American Weekly* revelation of about thirty years ago, and one of Hugo Gernsback's features in *Science and Invention* for the same period. I invoke Gernsback because he did know science and his authorities knew what they were talking about; I call on Hearst's Sunday supplement because this book has the same knack of making the ordinary sound stupendous.

This is, I suspect, because the book —or series of articles, which apparently was its first form—is aimed at a public who, in spite of their youth, have a lower level of scientific sophistication than ours of today. This is not to say that Soviet science is where ours was in the 1930s; it does mean that Russian scientific journalism, and presumably public understanding, is at about that level. As a result, an American reader is likely to find many or most of the engineering and chemical marvels old stuff. This will not be true of the biological predictions.

The propaganda level of the book is relatively low. Lenin and Mendeleev are invoked from time to time by most of the experts interviewed, simply because they both—Mendeleev as a chemist, Lenin as a social theorist—understood how science can shape the world. In most places ample credit is given to non-Soviet scientists. And if some of the schemes discussed seem to call for a world under one administration, it may be that the speakers are thinking of international co-operation rather than worldwide Communism for the year 2000.

By and large, this is a pragmatic world that we're shown. There is little development for its own sake; what is predicted fits into a picture of planned society and economy spread from the Pacific coast of Siberia and Red China across Asia and Europe to the undefined boundaries of the western People's Republics. For example, where American engineers might be talking of a national network of nuclear power plants, the Russians are predicting the more practical full utilization of water power, underground gasification of coal in place of mining, and direct conversion of chemical into electrical energy—all this feeding into a gigantic high-frequency transmission network extending clear across the face of the Eastern Hemisphere.

The emphasis on high-frequency technology is especially interesting; it crops up in several chapters, from different sources, and I presume it means that advanced work in the field is well under way. Blasts of high-frequency energy are seen drilling tunnels through the Himalayas, as automatic mining machines carry a network of powered highways across the face of Asia. Fuelless automobiles travel these roads, powered by induction from high-frequency cables laid under or beside them. Needless to say, such vehicles will be able to go only where the power

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lines have been laid, and they can be immobilized from a master switch.

Most interesting, though, is the emphasis on biology as the shaping force for the future. This, we are told, is something the two reporters did not expect when they started their interviews; it grew on them, and eventually took up a major part of their book. The Soviet biologists speak confidently of shaping and perfecting plants, animals, and men —of intensifying mental powers as well as resistance to disease—of finding a chemical substitute for sleep. In the surgical field, we are shown an experimental diagnostic computer—a supersonic device for crumbling resistant kidney stones in the body—bloodless surgery with a supersonic scalpel. Climate control is seen as a means of helping biology open the world's desert regions to agriculture, and make farming possible in the arctic.

One of the almost untouched sources of food and wealth is the sea, and an old friend, Arthur C. Clarke, has enlarged on this theme in a new book for young people, "The Challenge of the Sea"—Holt, Rinehart & Winston; 167 pp.; $3.95. The rocketeer turned skin-diver tells the story of marine research, some of the deep-sea mysteries it has solved and others it has revealed, and the potential harvest of the deep. Excellent illustrations by Alex Schomburg help make his points clear—though krill are not sardines, and sperm whales don't feed on 'em. Here you'll find a good deal of the fascination that the author put into his novel, "The Deep Range."

The biological future is also the theme of two small books—104 and 128 pages, respectively—published by Basic Books for $3.00. They are part of an excellent series on science and philosophy. The older and more daring of the two is by the French experimental biologist, Jean Rostand, and is entitled "Can Man Be Modified?" The newer and more conservative is by P. B. Medawar, the British winner of the Nobel Prize in medicine. It's title: "The Future of Man." It is a series of six lectures given for the British Broadcasting Company in 1959.

What Medawar does is spell out what we know about human heredity that may—when we understand more —enable us to predict the future of humanity. He also makes clear that he is not talking about individual men, but about mankind—the race, or significant portions of it. He points to the flaws in schemes for selectively breeding a race of supermen, common in both fiction and social planning of the Nazi type. Most important, of course, is that it destroys the innate variability in the human animal that has made it possible for us to adapt to a great variety of conditions.

Professor Medawar also makes clear that human society is subject to evolution, and it is this aspect of mankind—his malleable, alterable social organization—that will make it possible to surmount purely physi-

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cal and biological limitations. This in turn derives from the unique nature of the human brain, an organ whose responses can be conditioned and instructed, where the rest of the body is limited to a choice of built-in reactions.

Dr. Rostand, on the other hand, is talking about man as an individual, whose hereditary make-up and physical potential can be modified biologically and chemically in the sense that Aldous Huxley and others have suggested in fiction. This is the type of work in which he is himself engaged, and he is well aware of the fictional literature as well as of the scientific. He is closer to the mood of the Soviet biologists with their suggestions of altered individuals who can do without sleep, resist disease, and behave as supermen.

Both men—and the Russians—subscribe to Rostand's philosophy: "Man must aim at surpassing himself, at drawing from himself something better than himself." Dr. Medawar seems to be saying that this will be done slowly, through manipulation of social forces that affect the entire human race or large parts of it. Dr. Rostand and his Soviet colleagues see it done with a needle, under a microscope, changing the structure of the cells from which supermen will be born, physically and chemically altering the heredity of the race.

* * * * *

One page in Rostand's book, by the way, carries a quest of mine one step farther back in time. As I've said, he is well aware of the suggestions of science-fiction writers, and among his examples is "The Future Eve," by Villiers de l'Isle-Adam—whose synthetic heroine was named Androïde. This carries the first use of "android" to designate a biologically created robot well back beyond the science fiction of our time. How much farther will someone take it?

THE YEAR'S BEST SF, edited by Judith Merril. Simon and Schuster, New York. 1960. 320 pp. $3.95

Just about the best news at the Pittsburgh convention—next perhaps, to Robert Heinlein's near-miraculous appearance—was the word that Judith Merril's annual anthologies, nurtured until now by Dell First Editions, have been taken over by one of the world's top publishers. With all gratitude to Dell, S&S can give the books the promotion they richly deserve. They have also, I trust, done themselves some good in the process, for their few SF titles between Williamson's "Humanoids" and "The Worlds of Clifford Simak" were less than outstanding.

There is an ugly rumor afoot that every spring the year's best science fiction writers—a different lot each year—get together in the little town in northeastern Pennsylvania where Judith Merril, Damon Knight, James Blish and other bright lights of the field already live, and write the next year's "Best." The argument is that only this kind of intensive commit-

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tee action could produce such a distinguished lot of yarns; the counter-argument is that only distinct individuals could write them, and only a highly individual editor select them.

This fifth collection is right up there with the first two or three, and well in advance of last year's. As usual, only the librarians are likely to take the title seriously: Judith Merril can always be counted on for a balanced collection of good stories, exploring the scope of a very broad field, which make up an eminently readable book. In any year, strict adherence to a set of rigid literary or thematic criteria may produce a book of monotonous excellence—and monotonous is something no Merril anthology ever is. She ranges too far, nets the waters too thoroughly, and comments too pungently on what she has caught for that to happen.

In this collection, stretching from late 1958 into the beginning of 1960, we have eighteen stories, one editorial from this magazine, one newspaper story, and two bits of light verse. Analog is represented twice, by John Campbell's editorial, "What Do You Mean . . . Human?," which ranges around the title in fine, fervid Campbellian paradogic —my term for paradoxical logic— and by Darrel T. Langart's "What the Left Hand Was Doing," a nice little hybrid of psi and spy in which a scientist is to be rescued from Red China.

Damon Knight's "The Handler," from *Rogue*, opens the book. It's a beautifully wry variant on an old theme that I can hardly spell out. From the *Saturday Evening Post* and Jack Finney come "The Other Wife," one of the writer's twists on alternative lives inaccessible dimensions. Then it's Avram Davidson and *Playboy* for "No Fire Burns," which cuts into—and I might have said, cuts out—the heart of psychological testing and the ways it is used. We get into the mainline SF magazines with Cordwainer Smith's "No, No, Not Rogov!" from *If*; it is a strange tale of the Soviet scientist who developed a thought-reading machine that reached farther than he dreamed.

If you deny the possibility of mermaids, Ray Bradbury's "The Shoreline at Sunset" is fantasy, for in it two men and a boy find a mermaid on the Mexican sands. Because it's present-day Bradbury, however, the story is really about what such a marvel can do to men's personalities.

Humor can be in handling, as it is in Gordon Dickson's slight psi-yarn-with-twist, "The Dreamsman," from *Star No. 6*, or in gags, as in "Multum in Parvo," five snatches of willful anachronism by Jack Sharkey, from *Gent*. Then, boom!, you're plunged into the experience of Daniel Keyes' "Hugo" winner, "Flowers for Algernon," in which this new author deftly traces the growth and decay of a mentally stimulated moron. And then into John Campbell's thought-stimulating editorial; and then to an Associated Press story from the *New York Times* which brings us down hard on the reality of the robots in our midst—Ralph Dighton's account

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of "Sierra Sam," the pseudoman enough like you and me to stand in for us in vicious equipment tests.

Sentiment is out of fashion among the *avant gard* of literature; it's middle-class, non-U, anything but out there. But sentiment is a big part in the lives of most people, and it is beautifully handled, as ever, by Clifford Simak in "A Death in the House" from *Galaxy*. Here one of his lonely farmers finds a lost monster, tries to help it, buries it when it dies, then finds that his sacrifice is only beginning. Sentiment, of a very different kind, is at the heart of Fritz Leiber's "Mariana" from *Fantastic*, in which a world created to maintain an illusion comes crumbling down, bit by bitter bit.

A nibble of satire from *Monocle*: Roger Price's "Inquiry Concerning the Curvature of the Earth's Surface and Divers Investigations of a Metaphysical Nature." A poignant post-atomic-war story quite as good as Miss Merril's own: "Day at the Beach," by Carol Emshwiller, from *Fantasy & Science Fiction* . . . followed immediately by Randy Garrett, somersaulting in with six outrageous lines of verse to take the edge off. Then the Langart psi adventure; then, from the British *Science Fantasy*, "The Sound Sweep," by J. G. Ballard. This is a fantasy which, as Miss Merril points out, meets Fletcher Pratt's criterion of emotional and psychological integrity while it violates scientific plausibility.

Will Worthington, another new writer, is represented by "Plenitude" from *F&SF*, a story of a family of conservative country folk living off the land in a future where civilized men have become less than human. Then, from the same source, Theodore Sturgeon's "The Man Who Lost the Sea"—a story which has been selected by Martha Foley and Whit Burnett as one of the "Best American Short Stories of 1960." This, incidentally, is an honor that Miss Merril has also won. As might be expected, it is a story that goes deep into a man's confused mind.

To change pace at a needed moment, Miss Merril next throws in a bit from *Original Science Fiction*, "Make a Prison," light and puzzling. Then Mark Clifton, in "What Now, Little Man?", offers another puzzle—a problem story of man and his relations with the races he will find among the stars. And then another of those little, deft verses from *F&SF*, Hilbert Schenck, Jr.'s "Me." And that's it, except for an even more thoughtful summary of the year than we usually get, and the "Honorable Mention" list that is really all the science fiction anyone needs to read in a year.

There'll be a paperback, but the Merril anthologies are the ones you buy to keep.

MOUNT ANALOGUE, by René Daumal. Pantheon Books, New York. 1960. 157 pp. $3.00

This note is primarily for information: because of the title, and be-

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cause the lengthy introduction, describing the author's niche in French literature, calls it "an adventure tale bordering on science fiction." Daumal himself said he was trying to do for metaphysics what Jules Verne did for physics.

The book is unfinished; several pages of notes at the end suggest what the author intended to do, but not really what esoteric, symbolic significance he intended to derive from his account of an expedition of queerly assorted intellectuals, who intend to climb the highest mountain on Earth—a mountain enveloped in a kind of geometric or space-time warp, so that it is normally invisible, and that has its own strange flora and fauna, its own geology, and presumably its own metaphysics. It is a little more intelligible than such surrealistics fantasies as Coates' "Eater of Darkness," but the symbolism is buried layers deep on every page, nothing is what it seems to be, and with the book unfinished, nothing is ever clarified.

EIGHT KEYS TO EDEN, by Mark Clifton. Doubleday & Co., Garden City, N. Y. 1960. 187 pp. $2.95

This original novel achieves the unenviable distinction of typifying the best and the worst of what is generally considered "standard" ASF-brand science fiction.

It begins by showing us a future galactic civilization built around a philosophical concept—"E" for Extrapolation—which the author makes as comprehensible as A. E. van Vogt made its prototype, "Null A" or general semantics, magically incomprehensible. To solve social and scientific problems on a galactic scale, Mankind has had to find and breed a class of supermen, the Extrapolators, who cut completely loose from orthodoxy, question every fact and hypothesis, come at problems from impossible angles, and discover "impossible" relationships. Beneath their level, the galactic society has grown just as bureaucratically fogbound and riven with jurisdictional jealousy as the originators of "E" had foreseen.

As the story opens, the advance guard on the planet Eden has failed to report in. A Junior E, Calvin Gray, is sent to find out what is wrong and straighten things out. A politician seizes the opportunity to strike at the immunities of the whole E class. And the problem of Eden itself is no simple one—every human artifact has vanished into nothing, leaving the frightened colonists stark naked, unable to build fires or pin leaves together or build huts. And no sooner has Cal Gray landed than his ship, his clothes, and every other trace of his civilization also vanishes.

So far, so very good—but now the story shifts purpose and goes all psi, not very successfully. Instead of reasoning his way out of the trap he is in, Cal is handed the solution as a preamble to being given super-psi powers which, of course, open the universe wide to Man. I don't say that all this couldn't have been made convincing; I just say that it isn't—

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that everything comes too easily, and that the supreme secret of the mentalist race might just as well have been given to religiously cracked Louie or earthy Jed Dawkins as to Cal Gray, except that he has been labeled an E, and hence worthy of getting the prize. In fact, I'd have liked to see him, with only his E training, confronted with ordinary people who had suddenly acquired the supra-E powers of vibrational control.

I must also reluctantly admit that any geologist would have smelled a whole planet-full of mice if the crystalline structure on Crystal Palace Mountain is as it is described. Quartz takes some beautiful forms, but nothing as bizarre as the arches and other unnatural structures that we're shown.

THE UNEXPECTED DIMENSION, by Algis Budrys. Ballantine Books, New York. No. 388K. 1960. 159 pp. 35¢

This book is in itself an adequate answer to the claim that science fiction died in 1946. All of the stories in it have been published since 1954—three of them here in ASF—and they are as good as anything we have had in a long time. What's more, they achieve their excellence by combining good writing with good storytelling that should get through to any reader with an imagination.

There are seven stories in the collection, all good. In most of them the author shows a gift for portraying a subtly perverted society—by our standards—in which a believably complex person is torn between conformity and rationality.

The opening story, "The End of Summer," was here in 1954. We are shown a world of immortals which has endured for almost ten thousand years, where old men are always old men and boys are frozen as boys, with recorded memories hung about their necks like the Ancient Mariner's albatross. Dilettante Kester Fay carelessly kills a boy's dog, and this frozen society begins to come apart in his mind.

"The Distant Sound of Engines" is an ironic bit from last year's *F&SF*. A truck driver, his legs lopped off in a crash, finds himself in bed beside a horribly wounded someone from far in space, who in the night whispers to him the secrets of space and time. But Lenny has developed a counterman's special kind of memory . . .

"Never Meet Again"—*Infinity*, 1957—is perhaps the least of the lot, and the most gimmicked. Doctor Professor Kempfer flees from a world in which the Nazis won, into the alternate world of our own time—to find it bitterly the same. "The Burning World"—same place, same year—is the longest of the seven. again a future world brought into stasis, but unable to keep its balance. Here the personalities of the characters are all-important, as in any mature fiction.

"First to Serve," also here in ASF in 1954, is a varient on the too-

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human robot theme. Its value is in its ironic view of human motivation. "Go and Behold Them," from a 1958 *Venture,* is a completely strange and beautiful story about a terrible world. But the best of them all is the last, "The Executioner," published here in 1955, with its grimly perverted picture of justice in a viciously stratified society. Perhaps the end is a little too pulpily pat, but I choose to think that what Chief Justice Samson Joyce of Sovereign New York does then is the result of a mental breakdown in the face of a solutionless dilemma, rather than an about-face in social values.

Nobody killed science fiction.

THE SIOUX SPACEMAN, by Andre Norton; **AND THEN THE TOWN TOOK OFF,** by Richard Wilson. Ace Books, New York. No. D-437. 1960. 133 + 123 pp. 35¢

Again Ace gives us a completely new interplanetary adventure story by Andre Norton, and for good measure a reprint of Richard Wilson's "And Then the Town Took Off," a spoof that is as much fun as it was in its magazine version.

For reasons hard for me to fathom, the cover illustration for the Norton story has absolutely nothing to do with the story itself. The hero is a Sioux Indian, Kade Whitehawk—so he's shown as white. He is on Klor openly, as a trader—so he's shown in a hawk-mask, like some "Phantom" of space. The slave race of the story, the Ikkinni, are black-furred ET's with a crest like a gorilla's and a Roman nose—so they are shown as disconsolate humans in black shorts, chained together by the neck. Their slave collars, *not* chained together, are torture devices activated by a control box in the hands of an overseer for the Styor, masters of a large chunk of the galaxy—so it's Cade who has the box in the picture. There's a good story yet to be written around that cover.

My bilious griping aside, this isn't one of Miss Norton's very best action yarns but it's better than most and has a neat and valid ethnological gimmick. The human traders, though they can do nothing overtly, are surreptitiously undermining the Styor's strength on Klor. Cade Whitehawk picks up where a Sioux predecessor left off, and realizes that by introducing horses to Klor and letting them run wild, he can help the Ikkinni to become a race of horsemen like his own ancestors, and can give them their one chance to win independence of the Styor. Of course there's plenty of good, forthright action along the way. The relationships between men and animals are among the highlights of all Miss Norton's books, and here the horses momentarily come as alive as the people.

Richard Wilson's yarn isn't quite as much fun as his "Girls From Planet 5"—but what is? Here the completely screwy town of Superior, Ohio, home of the even screwier Cavalier Institute of Applied Sciences and of a bubble-gum factory, simply takes to the air, carrying with it a passing

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train. Aboard are a Pentagon courier, Sergeant Don Cort, the red-headed secretary of an airminded United States Senator, and assorted other characters; in town is a character to match every one of 'em. Underground—so to speak in the roots of Superior—there is also a posse of superintelligent extraterrestrial kangaroos, the Gizl, who are responsible for most of the slapstick monkeyshines. And so bad goes to worse, as well it might, with the turns of the plot far less predictable than the outcome.

WORLD OF THE MASTERMINDS, by Robert Williams. **TO THE END OF TIME,** by Robert Moore Williams. Ace Books, New York. No. D-427. 1960. 149 + 108 pp. 35¢

A longish novel, source unspecified—I'll learn it from some reader too late to tell you—and five short stories from as many magazines make up this all-Williams book. It is practically all formula-action stuff of ten years ago, more professionally handled in 1950 than it was in 1930.

The novel deals with a power-struggle on Pluto—a much too salubrious Pluto—between two men who are trying to track down a master race from the stars, which they suspect is meddling in human affairs, and the minions of a plutocrat—no pun intended—who wants the powers of the Masterminds to give him dominion over the Solar System. There's all kinds of fast action and a little mystery, but the identity of the real "Masterminds" is not much in doubt once they appear on the scenes.

Of the shorts, the title and cover story was in *Super Science* in 1950. It has one nice conceit: a Venusian race that *sings* people through time. Number Two, "Where Tall Towers Gleam," is a corny little fantasy about a boy's daydreams, from a 1952 *Fantastic Adventures*. It's my favorite of the lot. "Homeward Bound" is purely a gag story—*Startling*, 1950—about the man who won't believe there are Martians on Earth.

"When the Spoilers Came" is from *Planet Stories* in 1952—the one about the man who protects the Martians from exploitation, more believable and better done than when I, among others, did it twenty years before. Finally, "Like Alarm Bells Ringing" from a 1947 *Amazing* wasn't new then, either: this time the super race discovers us humans diligently plugging our way toward holocaust or immortality.

Probably all these themes would be novel and exciting to a brand-new reader. Trouble is, the novelty and excitement vanishes after he has read them eight times in five magazines within six months.

THE WORLDS OF CLIFFORD SIMAK, Simon and Schuster, New York. 1960. 378 pp. $3.75

Simon and Schuster, after a good deal of time-marking, have hit another winner in this collection of twelve stories by one of the most

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competent writers in the field. Two of the stories, including "The Big Front Yard"—Hugo winner for best novelette of 1958—were first published here; the other was "Neighbor," in 1954. One came from *Infinity;* the rest are from *Galaxy.*

Looking at these stories together, it is easy to see why Kingsley Amis, in his "New Maps of Hell," characterized Clifford Simak as "science-fiction poet laureate of the countryside." Indeed, he labels the nostalgia for a rural life, which he finds to be an important theme in American—but not British—science fiction, "the Simak syndrome." Well, the author, a Minneapolis newspaperman, lives in some of the most beautiful countryside in the world and has every right to be its laureate, though I've pointed out that this is a legitimate American attitude and not his exclusive possession. Amis might, reading this collection, have spotted a more truly Simakian theme: that extraterrestrials are friendly people at heart, and we can do business with them. Sentimental this approach may be; mawkish it never is. And its people—bug-eyed or not—are folks you'd like to meet, unless you're a beatnik-type aesthete.

To start with home products, "Big Front Yard" is king of the trading yarns by virtue of its award and the loving detail of the strange world that critters from somewhere create outside Hiram Taine's front door. With the help of his dog and the local handyman he builds this accident into a galactic good-will mission. Still, with all it offers, I prefer the opener, "Dusty Zebra," in which a small boy and a couple of over-zealous adults create a trading chaos. And, in an entirely different vein, trading of a kind is at the heart of "Jackpot," in which a shipload of sharp operators try to find a way to take full advantage of a treasure they find on a nondescript planet of a nothing star.

As for the friendly ET's, they don't always trade. I can't say what they are after in "Honorable Opponent," a thoroughly switched space-war story—though I am afraid the gimmick is telegraphed. In "Carbon Copy" an interstellar aid program backfires hilariously; in "Operation Stinky" a not-quite-skunk from a flying saucer drives the Army nuts by do-gooding in a heavy-handed sort of way; in "Green Thumb" a small-town man befriends a walking plant and is somewhat embarrassed by the results; and in "Neighbor," also first published here, another stranger from the stars fits quietly into the rural setting and makes a place for himself and his family.

What else? Well, Clifford Simak does have other strings to his bow. "Founding Father" is a gently bitter commentary on the subterfuges men must adopt to live alone on far worlds. "Idiot's Crusade" shows suddenly granted mental power as a coin spinning on edge, good and evil alternating dizzyingly. "Death Scene" is the simplest, shortest and subtlest of them all—just an old man dying quietly by the rules. And then, for

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complete contrast, we have "Lulu"—the love-sick, starry-eyed robot spaceship who must have been the inspiration for the recent "Fearless Fosdick" sequence in Al Capp's "Li'l Abner".

This is a collection that you can recommend to anyone. I hope every library in the country gets several and lets it wear out in circulation. And I hope Simon and Schuster—who are taking over Judith Merril's superb annual anthologies—has found an editor who will pick more books as good.

REPRISE

LOOKING BACKWARD, by Edward Bellamy. Signet Classics No. CD-26. 1960. 222 pp. 50¢

This is America's classic Utopian novel, whose hero was looking backward from the year 2000 to 1887, when it was written. You may no longer find it readable, but you may be interested in the special introduction by Erich Fromm, which helps explain the tremendous influence the book had—far greater, certainly than any other that is technically science fiction.

AGAINST THE FALL OF NIGHT, by Arthur C. Clarke. Pyramid Books No. G-554. 1960. 159 pp. 35¢

Here is an oddity: a paperback edition of the original Gnome Press version of Clarke's great poetic novel of the far future, which he later rewrote as "The City and the Stars."

THE FOURTH GALAXY READER, edited by H. L. Gold. Perma Books No. M-4184. 1960. 239 pp. 35¢

The Doubleday edition was out in 1959; the stories date from 1956 and 1957.

THE TIME TRADERS, by Andre Norton. Ace Books No. D-461. 1960. 191 pp. 35¢

Ace, which has published several Norton originals, very properly recognizes that there is nothing childish about her "juvenile" novels of space-and-time adventure. If literary snobbishness kept you from getting the World edition in 1958, there's no stigma on it now. Time travel to Bronze Age Europe . . . a race of galactic marauders . . . shipwreck in the distant past: this yarn has everything!

SENTINELS OF SPACE, by Eric Frank Russell. Ace Books No. D-468. 1960. 179 pp. 35¢

This is a second printing, with a new number, of the popular superman story by one of England's recently inactive masters of fantastic adventure.

THE GREATEST ADVENTURE, by John Taine. Ace Books No. D-473. 1960. 256 pp. 35¢

Although the original novel came out in 1929, it remains one of "John Taine's"—Professor Eric T. Bell's—best. Strange dinosaurlike creatures turn up in the antarctic, but are far from what they seem.

THE END

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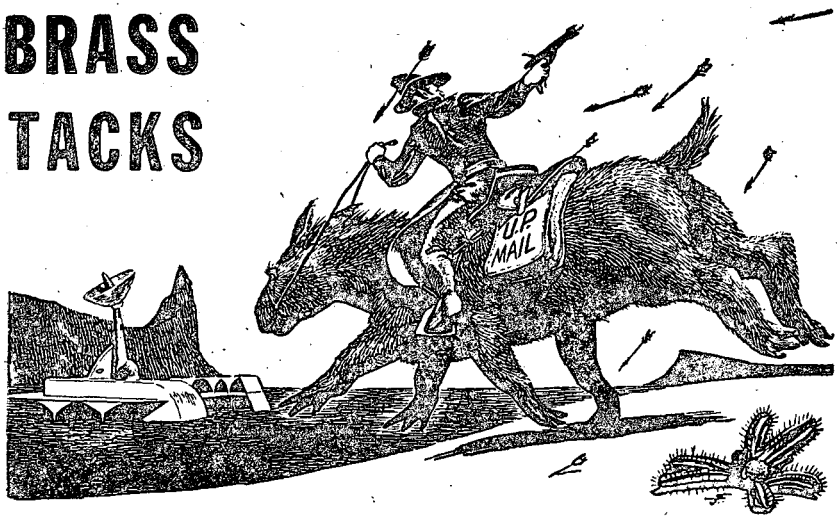
BRASS TACKS



Dear John:

The article, "The Electric Field Rocket," by Dr. H. C. Dudley in the November 1960 issue was of extreme interest to us. This is, to our knowledge, the first use of model rockets for experiments in physics.

In the October 1960 issue of our NAR newsletter, "The Model Rocketeer," we have requested that NAR members all over the country repeat Dudley's experiments and report their findings.

Three different NAR groups have been specifically requested to perform the experiments on their instrumented model rocket ranges. Two of the groups are in Colorado—Denver and Colorado Springs—at 5000-foot altitudes in a very dry climate. The other group is in the Long Island area. These groups have accurate optical methods of determining peak altitudes of model rockets and means to record weather factors as well. All groups will follow the instructions detailed by Dr. Dudley in his article.

All data will be collected at NAR Headquarters in New York City. It will be evaluated to determine validity. We will then forward to you and Dr. Dudley copies of this data.—G. Harry Stine, President & Trustee, National Association of Rocketry, Suite 1962, 11 W. 42nd St., New York 36, N. Y.

Competent amateur research and checking is exactly what's needed. We'll run reports when available.

Dear Mr. Campbell:

I write you more in sorrow than in anger. The article "The Electric Field

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Rocket" in the November issue is perfectly ridiculous. I would consider it a spoof or joke, but can't find anything funny in it, so I must assume it was meant seriously.

Dr. Dudley states that his "charged" rocket rises four hundred per cent farther—presumably five times as far. The total rise is proportional to the total thrust, assuming the firing time is constant, and the total net thrust is the thrust of the engine minus gravity. Since "charging" the rocket doesn't change the engine, it must reduce the gravitational attraction, and a brief calculation indicates that it reduces it considerably. It therefore follows that it should be possible to weigh a plastic rocket, paint it with aluminum paint, reweigh it and find it weighs substantially less the second time. This I do not believe.

This leaves us with three other possibilities. One is that the aluminum is reducing drag or air friction. My neighbor, an aeronautical engineer, considers this highly unlikely. The other two are that there is an unknown effect or that the experiment is phony. I am not inclined to choose between these.

Regarding the latter part of this article, freshman physics teaches that whilst the electrons—which are presumably real—move from—to + the current—which is a formal concept with no physical reality—moves from + to —. This is not as silly as it sounds since in chemical cells, with which I am mainly concerned, there may be positive ions moving in one direction, negative ions moving in the other or both moving in opposite directions, and the current still flows + to —.

I cannot for the life of me see how a man who knows enough physics to be a radio bug could pass this article. Your science articles have a high reputation, but this is a low ebb.

If it was a joke, my apologies, and I am deficient in the sense of humor. —S. W. Bowne, 2615 N. Fountain, Wichita, Kansas.

The essence of Science is Experiment —NOT theory! The article reports an experiment, one readily subject to test. The fact that "it makes nonsense" theoretically—and I fully agree that it is theoretically nonsense!—has no bearing whatever. Remember that, theoretically a bumble-bee can't fly, and that it was shown, theoretically, that Edison's electric light system could not be practical because no electric generator could be more than fifty per cent efficient!

The way we get better theories is by doing something theoretically impossible—and then getting a new theory!

Dear Mr. Campbell:

As you know, we at Edmund advertise in Analog and have for some time. Being an old science-fiction enthusiast, personally, I tried to latch on to our checking copies each month and read them—as a science

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fiction enthusiast rather than an Advertising Manager. However, I was very interested to read in the October 1960 issue your Science Fact article on the self-repairing robot and discover that in essence it covered crystal growing and that you mention Cenco Scientific as a possible source of crystals for your readers, mentioning, however, that they did not sell to individuals.

I hasten now to bring to your attention that Edmund Scientific Co. does sell to individuals and that we have put together a crystal growing kit, our No. 70, 336, which sells for $9.50 postpaid. With it you can do a crystallography project. We include in it the book that you recommend, "Crystals and Crystal Growing," plus the chemicals you need to grow display crystals of potassium aluminum sulfate, potassium chromium sulfate, potassium sodium tartrate, nickel sulfate hexahydrate, et cetera.

Incidentally, we have developed a complete line of science project kits that run from lens and optic kits to crystal-growing kits, solar energy, spectroscopy and even soil testing, basically designed for the Science Fair enthusiasts but which might be of interest to your readers.

May I hear from you?—W. J. McCann, Advertising Manager, Edmund Scientific Co., 101 E. Gloucester Pike, Barrington New Jersey.

Edmund Scientific can supply some of the materials in kit form—which is a big help getting started. However, it is a kit and, if you want some of your own original oddball substances to work with —well, Edmund is not a chemical supply house.

Dear Mr. Campbell:

As a long-time reader of ASF, I wish to congratulate you on the quality and readability that you have long sustained in your publication. Your "fact" articles have proved to be very interesting indeed, and a valuable adjunct to the fiction. In fact, I was enjoying your latest on crystallography—October, 1960—when I tripped over what seemed to be a minor error in your account of the ethylene diamine tartrate crystal program at Western Electric.

In your account, "mutant" crystal forms took over, forcing the EDT crystal program to an end.

According to another account, a three-day investigation of the new crystals showed them to be a monohydrate form of the desired EDT crystals, but also proved that this form should always tend to appear under the conditions that happened to exist. It seems that the temperature at which the crystal-growing solutions were maintained favored the monohydrate form over the desired form. The monohydrate was slightly less soluble than the desired form at the temperature provided, hence, tended to crystallize more readily. Any speck of dust or previously-existing monohydrate crystal could trigger the undesired form.

The researchers predicted that by

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raising the temperature four degrees, the desirable EDT crystals should be favored. When the temperature of the Western Electric solutions were raised four degrees, sure enough, the EDT crystals "fed" on the monohydrate crystals; that is, the precarious equilibrium between the two forms was tipped in favor of the desired crystals. The EDT crystals resumed their growth, while the monohydrate crystals slowly dissolved in the supersaturated EDT solution.

Far from *wrecking* the EDT crystal program, the newly-discovered monohydrate crystal form actually helped it. Monohydrate crystals proved far superior for replenishing the crystal baths. Since the monohydrate crystals were less stable than the anhydrous form at the new, higher growing temperatures, it provided less chance of starting spurious crystal growth, than if the previous EDT salt were used. In addition, crystal-growing solutions fed with the monohydrate crystals could be used longer before it became necessary to remove accumulated impurities from the solution.—Albin R. Meier, 2413 Alvin Street, Mountain View, California

Thanks for the additional information on EDT crystals. I knew of the "mutant" monohydrate crystals, and knew they had switched to growing quartz—superior to EDT for their use anyway—at about that time. I understood the monohydrate forced them to make the change.

Evidently the anhydrate and monohydrate of EDT act like the hexahydrate and heptohydrate of $NiSO_4$—both can be grown simultaneously at one exact temperature.

Dear Mr. Campbell:

Having just read Mr. Reynolds' propaganda article-story, "Combat," in the latest issue of *Analog*, I feel that your readers are entitled to hear an opposing view on the issue of the United States-Soviet race—a view that makes clear that the issue is not as cut and dried as Mr. Reynolds—despite his obviously great knowledge of the Soviet Union—seems to think. The following is an excerpt from the March 1960 *FORTUNE*, p. 87-92, which is in turn an excerpt from the introduction to Colin Clark's book, "The Real Productivity of Soviet Russia." Mr. Clark is, according to *FORTUNE*, a "distinguished British economist of Oxford University, and research director of the Econometrica Institute."

He writes: "A child recovering from a serious illness shows, for two succeeding weeks, a rapid gain in weight. The doctor plots these figures on a logarithmic diagram and deduces the conclusion, which he tells to the parents, that in a little over a year the child is going to weight more than its father. If any doctor acted in this manner, he would be regarded as not qualified to practice. Yet economists go on making the same mistake . . .

"It should be a commonplace of

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economics—though many prominent economists have in fact failed to see it—that when a country is recovering from war, invasion, and similar disasters, which have reduced its productivity to a low level, there will be a recovery period in which growth is rapid, followed by a period of gradually decelerating growth as productivity approaches that position on its normal trend line which it might have been expected to reach had the war not occurred. This is exactly what has been observed in Germany, Japan, and Italy—countries which suffered devastation comparable with that in Soviet Russia. . . .

"The results obtained by long and careful analysis of Soviet productivity can all be (summarized as follows): The information for the years after 1953 shows in actuality the rate of growth slowing down, as had been predicted . . . Over the whole period 1913 to 1956 the long-period rate of growth averaged 1.2 per cent per year . . .

"These figures should be compared with the rate of growth of real product per man-hour found in the United States and other free market countries. Subject only to minor fluctuations, the United States, ever since the 1890s, has maintained a steady rate of growth of real product per man-hour of 2.3 per cent per year . . .

"These conclusions about the comparatively low long-period rate of economic growth in the Soviet Union . . . are fully confirmed, however, by some very thorough researches into the trend of man-year and man-hour productivity in Soviet manufacturing industries carried out by Professor Nutter, of the University of Virginia, for the National Bureau of Economic Research, New York. Some extracts from these results have appeared in *American Economic Review*, 1957-58. . . .

"Governed by fanatical materialists, the Russian people have been called upon to sacrifice their personal liberties, their national traditions, and their religion for the sake of material progress; and all that they have received in return is a rate of material progress far below that of most other countires. The poor and uninformed peoples of Asia, Africa, and Latin America are persistently being told . . . that Communism, while it may have certain drawbacks, is nevertheless the key to material advancement. It should be made clear how very mediocre the economic results of Communism have, in fact, been. . . .

"Nor can it be contended that, while free-market economics may represent the best system for comparatively advanced countries, poorer countries 'need Communsim' in order to get them started from an economic level at, the end of the nineteenth century, far lower than that of Russia, and with a predominantly free-market economy has been able to obtain a far higher rate of economic growth . . ."

I could quote quite a bit more—I'm tempted to quote the whole article. However, I think Mr. Clark's

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conclusions should be taken with a little salt, since *FORTUNE* published the article, apparently, to oppose suggestions for increasing United States taxes and using the revenue to speed up the United States economic growth rate. The suggestion is that, if we're patient, and wait a few more years, we will win the economic race with Russia without any special efforts at all.

Of course no argument can deny the remarkable space technological feats that the Russians have performed. Quite possible their scientific progress is relatively independent of *overall* economic growth. In the years of 1959 and 1960, for example, when great successes have been achieved in the Russian satellite program, agricultural productivity has been significantly below that of 1958 in the Soviet Union.

Despite my doubts about Mr. Reynolds' extrapolations, I enjoyed his article-story, and hope it draws comments from other readers as well—Ernest Schlesinger, 2486 Shattuck, Berkeley 4, California.

Mr. Clark's article represents the always-pleasant-to-listen-to proposition "We don't have to do a thing—we're sure to win!" It makes the gross error of comparing countries already highly industrialized—Germany, Japan—with a previously undeveloped nation. Russia's growth is not mere recovery-from-injury, any more than China is "merely recovering from the confusions of wartime."

Dear Mr. Campbell:

In reading over some back issues of Astounding, I came across what I believe was your first editorial on the Land color process. In that article you expressed an opinion that the color television system now extant is doomed because of the Land process. Perhaps you would be interested in the following information.

The R.C.A. color system is a three-color system. It utilizes, essentially, three colored filters in front of three separate camera tubes. The relative gains are adjusted until the output from each tube is the same when the camera is shooting a reference white area *under the light to be used for the colorcast.* This latter condition eliminates the problem that tungstens are not the same color as sunlight.

Now. You have three signals for one picture. How do you transmit them? Because of the requirement of compatibility, one of these components had to look to a b-w receiver like the signal of a black and white camera shooting the color scene.

The final solution was this. For the black and white component, a combination of the R, G, and B cameras was made as follows.

1W equals 0.30R + 0.59G + 0.11B.

(The relative components are not equal because the eye is most sensitive to green, less to red, and least sensitive to blue by approximately the ratio expressed in this equation. It is to be understood that R, G, and B are the color standard triad used by the R.C.A. process.)

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Besides this W or black and white component, an I and Q component are obtained by matrixing according to the following equations.

$$I = -0.28G + 0.59R - 0.32B$$
$$Q = -0.52G + 0.21R + 0.31B$$

It should be understood that this matrixing operation makes new colors from the RGB triad. In the R.C.A. system, it is the W, I, Q triad, not RGB, which is transmitted.

The relation of the R.C.A. and Land system is this. The R.C.A. triad, which is transmitted, is made up of three colors:

I, which defines the position of the color along the blue-green to orange-yellow axis of a color triangle,

Q, which defines the colors position along the magenta to green axis of a color triangle,

And W, which contains the luminence or black and white portion of the picture.

Observe: A three-color system made of only two color components and a brightness component! Two colors.

It should be noted that the I and Q signals add numerically to zero, which means that they carry no brightness information. On the other hand, the W signal adds to one.

I submit that the Land system is analogous to the R.C.A. system. It, too, has two color signals and a luminence signal. The luminence must be present in each of the records in the Land process, or else no record would be possible.

The direction of the I axis was not accidental. It was chosen because the eye is most acute to color differences along this axis. And, it may be noted that there is a blue-yellow color blindness, in which the person is able to distinguish only along the blue-yellow axis, which is roughly the same as the I axis.

Thus there is a strong correlation between the characteristics of the eye and those of the R.C.A. system.

In conclusion, I reiterate. Far from being made obsolete by the Land system, the R.C.A. system is a practical application of it.

(It is interesting to note, however, that you couldn't get I and Q from cameras with I and Q filters, because such filters would have to have negative transmittance to some frequencies.)—Richard Matzner, WNDU-TV, South Bend, Indiana

I still disagree—because the Land Process involves only two information channels, not three: Which three is not really significant; it's the fact that three must be handled that counts!

Dear Mr. Campbell:

It is now only a half an hour from the moment when I rushed madly to my mailbox, eager and ready to see what the latest news was on the Dean Device. It was while going through your latest article about Dean that one sentence rang a bell in my mind. This is where we come to the point of my letter.

If you go through the Brass Tacks

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section of the November 1951 issue of your magazine, take notice of a letter sent to you by Edgar R. Schot of a possible new type of drive based on the proper phasing of two electromagnets in regard to each other. In case you don't remember, you answered that "although action and reaction are Newtonionly equal and opposite—they aren't simultaneous!" It was this that I thought of when I saw your explanation in the November issue, quote, "The fault in the 'proof' is that while the two forces are equal and opposite, they do not have equal duration." Tell me, are they or aren't they based on the same phasing principle.

Enclosed is a copy of the last part of Schot's letter which I hope you will print for those of us who aren't oldtimers. I also ask Schot, if he reads this to excuse me for my audacity in writing this letter but to remember I have vindicated myself by defending him. How about it? Is it or isn't it based on the same principle. From a reader who hopes to be with you many more years—Harry Sommer, 43-34 Union Street, Flushing 55, New York.

When a piece of soft iron is brought near the pole of a magnet, the effect of its field is to so affect the iron that it is attracted toward the magnet. The effect on the iron is to produce in it the condition which sets up a magnetic field of opposite polarity to that of the magnet. There are then two opposite fields interacting. The magnet and the iron move toward each other. In some manner the particles of iron, instead of moving at random within the mass, begin to move in a certain direction. Can this effect be produced by any other means?

What if you could have a magnet with only one pole? Would that mean it would move forever, or to tend to move through space?

The effect of a magnet is produced by its field. A field is propagated at the speed of light. If an electromagnetic pole of great strength is located in Missouri, and a piece of soft iron is located 186,000 miles away, it will take one second for the field of electromagnet to reach the soft iron and another second for the field induced in the soft iron to reach back to the electromagnet. The soft iron would build up its field and start to move toward the electromagnet after the electromagnet had been on for one second, but it would take another second for the field of the soft iron to reach back and cause the electromagnet to move toward the soft iron. If, just as the field of the soft iron reaches the electromagnet, the electromagnet changes its polarity, there will ensue a time during which both the electromagnet and the soft iron tend to move in the same direction. The soft iron will have been attracted toward the electromagnet, and the electromagnet will have been repelled away from the soft iron because the electromagnet changed its polarity. If the electromagnet retains its new field for two seconds, its field will move out to the

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soft iron and induce an opposite polarity in it, cause it to move toward the electromagnet and send its new field out. The new field will reach the electromagnet just as it changes polarity. Again we have both the electromagnet and the soft iron moving in the same direction. Thus, we have a cycle, which can be repeated.

Synchronize two electromagnets as above at a distance of one foot. How about it? Do we get propulsion or not?—Edgar R. Schot, Benton, Mo.

Sorry . . . not the same thing! I heard later that some experiments on Schot's idea had been tried, with the interesting conclusion that he had, in effect, derived the phenomenon of light-pressure—opposing electromagnetic fields!—in a new way. At any usable frequency, the energy radiated by the oscillating electromagnetic fields simply brings the thing down to the "photon drive".

Could be done . . . theoretically!

Dear John:

I meant to write this letter before and now that "In Times To Come" informs me that a new Kenneth Malone tale is soon to be upon us I must ask you this: How long has Leslie Chartereis been writing under the pseudonym of Mark Phillips? Or, if I'm wrong, is Mark Phillips paying Leslie Chartereis royalties for the use of the Chartereis style and the name John Henry Fernack of the New York Police?

I will confess that I didn't really catch on until the Fernack name popped up along with a reference to "another troublemaker" of years gone by. Oddly enough, the vigor, wit and style of the Mark Phillips stories which first made me compare them to Chartereis are the very things least in evidence in the current Saint stories. Am I wrong? If I am, my apologies to Mr. Phillips and my regrets to Mr. Chartereis.

As a reader of Astounding/Analog for ten years I guess I might as well add my poorly typewritten opinions to this. Obviously I enjoy the magazine or I wouldn't continue to buy it at the awful price of 50¢.

I enjoy Brass Tacks immensely—even when I don't understand it. I neither prefer nor object to the new title so long as the quality of the stories remains the same—August and September issues weren't too hot. I have a preference for fantasy and humor and a marked distaste for characters who laboriously spend 1,500 words describing How Civilization Got Here and then resolve the plot—unsatisfactorily—in about 500 words.

I *do* like your editorials. Even when they are a trifle long or when I think you are nuts. Because every now and then you come up with a gem I can treasure. (My favorite being—a misquote I am sure—"There's nothing worse than a completely honest, incorruptible man who knows he's right—and has the wrong facts.")

Have fun.—Don Culp, 3391 Barham Blvd., Hollywood 28, California.

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Mark Phillips is one of our two-headed authors—but neither head is Saintly.

Dear Mr. Campbell:

You can't use the Dean drive in an atomic submarine as proposed in your June issue because the submarine is too heavy. Take, for example, a typical nuclear-powered attack submarine, the Seawolf. You give the figure of three tons thrust for 150 horsepower in your issue. The Seawolf has 15,000 horsepower and so should be able to produce a 300-ton thrust. But its light displacement —from Jane's "Fighting Ships 1959-1960,' the same as the horsepower figure—is 3,260 tons. YOU CAN'T GET OFF THE GROUND BECAUSE YOU DON'T HAVE THE POWER. Granted that your Dean drive spaceship could use directly equipment, power systems, and experience from atomic submarines but can't use the submarine itself.

I agree with the rest of your ideas. Orthodoxy can develop to a deadly disease and Dean's drive is potentially the most important invention since the wheel.—Richard J. Weader, II, 98 Markham Place, Little Silver, New Jersey.

Hm-m-m—we'll need boosters for that first one hundred kelomiles, I guess. My error!

Dear J W C:

Re Dr. Dudley's article.

I would like to point out that the anomaly in maximum altitude attained by conducting and by nonconducting rockets might easily be due to effects not at all involving the earth's electric field.

In the first place, the electrical interaction between the rocket's shell and its exhaust gases is not discussed. It may well be that exhaust velocity is drastically influenced by attraction to or repulsion from the shell.

Second, and probably more significant is the influence of the rocket's electrostatic field upon the surrounding air. Since these rockets have low penetration and short impulse, peak altitude is very much dependent upon drag. Slight modification of the airflow characteristics by the rocket's field could have great effect upon trajectory. That this is happening seems likely, since the doctor relates that stability appears to be affected by charge, and stability depends largely upon aerodynamics.

It could be very instructive to see the results of a series of catapult launchings of rocket shells similar to those used in the experiment. If the anomaly still occurs, we can at least discount electrical interactions involving exhaust gases as a factor.—Robert O. Woods, Princeton, New Jersey.

This sounds like a good point, capable of direct test!

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Continued from Page 7

Any method of testing, any formal, logical, reasonably worked out and rationally structured technique of selecting those fit to rule . . . will be structured according to the examiners' theories of what "wise, benevolent and competent" means. The use of *any* rationally designed test simply means that the rationality of the test-builders is clamped on the examinees. They pass if they agree with the test-builders.

I suggest, therefore, that the selection of rulers must be based on some nonrational method! Some method which, because it does not involve any formal—or even hidden-postulate!—theory, will not allow any special philosophy of "wise, benevolent and competent" to be clamped on the future rulers.

One possible irrational method would, of course, be selection by random chance. I think it's not necessary to go into details as to the unsuitability of that particular nonrational method.

The method I propose is a nonrational method which, however, practically every logician will immediately claim is the very essence of rationality. It is, of course . . . in an *ex post facto* sense. I suggest a pure, nontheoretical pragmatic test.

Of course, since the ultimate goal of rationality and logic is the mapping of pragmatic reality, there's a strong tendency for logicians to claim that any real, pragmatic test is logical. That's not a valid statement; while it is true that a chain of reasoning is valid if, and only if, it correlates with reality, it is not true that a thing is real only if it correlates with logic.

A pragmatic test is, therefore, a nonrational test. It may be said that "It is rational to use a pragmatic test," but that doesn't make a pragmatic test a rational test. It does not depend on theory—and any rationality does.

The only way we can maintain flexibility of viewpoint in our rulers is to make their selection immune to theoretical determination.

Aristocracy operates on the theory that wise men have wise sons. The theory has value . . . but it isn't sound enough for reliable, long-term use. It gets into trouble because, *theoretically,* the son of the benevolent monarch will be benevolent, but practice turns up a not-quite-drooling idiot every now and then—and the theory of aristocracy can't acknowledge that.

The Communists hold the reasonable sounding proposition that only the politically educated should be allowed to vote. Therefore only Party members, who have been given a thorough education in political theory and practice, are permitted to vote. There's certainly a lot of sound value in that idea; it's not unlike Plato's carefully educated philosopher-kings as rulers. And suffers the same serious flaw; the way to pass an examination is to give the answers the examiner expects. The idea sounds good, but has the intrinsic difficulty that it

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rigidly perpetuates the political theories of the originators.

A theocracy accepts that only the dedicated priest is fit to rule, because his dedication to things above and beyond this world, and his communion with God, make him uniquely qualified. That system's worked fairly well, now and then.

Robert Heinlein, in his recent novel "Starship Trooper," proposed that only those who accepted the responsibility of defending the nation in the armed forces should have the right to vote. There are very few systems of selecting rulers that have not been tried somewhere, somewhen; that military-responsibility test for rulers has been tried. It works very well . . . so long as the military is run by wise, benevolent and competent instructors. That, however, as I've said, is true of any system of government whatever. In actual practice, the Roman Legions became the effective rulers of Rome during the Empire period—and the results were horrible. Anyone wishing to be Emperor need only bid for it, and if he offered the Legions enough money, they'd murder the current emperor, and install him. One Emperor lasted four days, as I remember it, before someone outbid him.

This, again, is based on the theory that the Legions *should* feel responsible.

Finally, the theory of popular democracy says "Let everyone vote; do no selecting of rulers, and there will be no unjust rulers in power."

That theory is fundamentally false, by ancient and repeated pragmatic test. Maybe it *should* be true, but it isn't. The most deadly dangerous, destructive and degrading of all possible rulers is installed in power when true Popular Democracy gets into power.

The difficulty is this; the old saw that "Power corrupts; absolute power corrupts absolutely," is not quite correct. Power does not corrupt; no matter how great the power a man may hold, he will not become corrupt . . . *if he is not also immune.* It is immunity that corrupts; absolute immunity corrupts absolutely. I need very little power to be a force for unlimited destruction—if I am absolutely immune.

Therein lies the key to that horrible mass-entity known as the Mob. A mob has no organization that can be punished; it is immune.

The members of the mob are immune through anonymity. It has huge physical mass-power; it is immune to the resistance of its victims, and to the opposition of any normal police force. Only an army can disrupt a mob; even so, the mob cannot be punished—called to account and its immunity broken—because it simply disperses, and no one of the ordinary citizens who composed it is the mob, or "belongs to" the mob.

The immunity of the mob can produce a corrupting and degrading effect that utterly appalls those who were swept up in it, afterward. No viciously sadistic affair in the Roman Arena exceeds in corruption and

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degradation what a modern mob, anywhere in any nation today, including the United States, will do. The mob will do things that not one member of that mob will consider doing.

Immunity, and the sense of immunity, is the deadliest of corrupting influences. It is, in essence, simply the result of cutting off the normal negative feedback, the pain-messages that warn of excesses. Imagine yourself not only blinded, but deprived of all kinesthetic sense, so you could not tell where your limbs were, how hard your muscles were pulling, or whether you were touching anything; you would then be totally immune to external messages. You would certainly tear yourself to pieces in a matter of minutes.

The record of history seems to indicate one fundamental law of civilizations: *The Rulers must always be a minority group,* or the culture will be destroyed.

Note this: under the exact and literal interpretation of democracy, it is perfectly legitimate democracy for a ninety per cent majority to vote that the ten per cent minority be executed by public torture, in a Roman Arena style spectacle.

The advantage of having the Rulers a minority group is that, under those conditions, no group has the deadly feeling of immunity. The Rulers are a minority, and know it, and must rule circumspectly; like the *mahout* driving an elephant, they must rule always with the realization that they rule by sufferance only—not by inalienable right.

The majority, then, knows it is ruled—that it is not immune to punishment, that it is not free to become a mob.

True popular democracy—true rule by the majority—establishes the government of the mob. It was the growing influence of the people of Rome, under the venal and practically inoperative rule of the Legions—the Legions wanted money, not political responsibility; they were fools, rather than villains—that built up to the demand of "Corn and Games!" and the consequences that followed.

A minority group, aware that it is a minority group, is also aware of the problems of other minority groups through direct, personal experience.

Long ago, Machiavelli pointed out that the Prince cannot rule in the face of the active opposition of his people; the Prince must rule circumspectly, for he is a minority.

So whatever system of choosing Rulers we may select for our Utopia —it must be a system that never allows any group to achieve the position that, inevitably, every group wants to achieve—a position of security! The concept of "security" is, in essence, the same as "immunity"; I am secure if I am immune to all attack, or efforts to punish or compel me. The Rulers must never be secure; since they are to have the power of rule, they must not be a majority, so that there will be the ever-present insecurity of the potential threat of the great mass of people. The majority, on the other hand, must

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never have security from the power of their rulers—or they become a self-destructive mob.

This boils down to the proposition that we want a non-theoretical-rational test for selecting a minority group of people who will be, with high reliability, relatively wise, benevolent, and competent.

The simplest test for this, that does not depend on the rationale and prejudgment of the examiners, is the one the founders of the United States proposed—and which we have rejected. It's quite nontheoretical, and hence has a tendency to be exceedingly irritating to our sense of justice—sense of "what ought to be." The test is simply whether or not a man is competent to manage his own affairs in the real world about him; is he a successful man in the pragmatic terms of economic achievement?

The difference between a crackpot and a genius *is* that a genius makes a profit—that his idea is economically useful, that it returns more in product than it consumes in raw material.

Now it is perfectly true that competence does not guarantee benevolence. But it's also true we have, for this argument, agreed that we're not designing a constitution for Heaven, but for Utopia—an optimum engineering system, not a perfect system. Inasmuch as no one can define "benevolent," we're stuck on that one. But we can say this with pretty fair assurance: a man who consistently injures his associates will not have a successful business for long. A man may *hurt* his associates quite commonly, and be highly successful—provided his hurts are, however painful, essentially beneficial. The good dentist is a simple example. But the man who injures will not be successful for long; the "painless" dentist who is incompetent, and uses lavish anesthesia to cover up his butchery, for instance, doesn't *hurt* his patients, but won't remain in business long.

The founders of this nation proposed that a voter must have five thousand dollars worth of property—a simple economic test, perfectly pragmatic tied with no theoretical strings about how he garnered his five thousand dollars. The equivalent today would be somewhat nearer one hundred thousand dollars.

That particular form of the test is not quite optimum, I think; instead of a capital-owned test, an earned-income test would be wiser, probably. A man can inherit property, without inheriting the good sense of the father who garnered it. But earned-income is a test of *his* competence.

It violates our rational-theoretical sense of justice, because not all men have equal opportunities for education, a start in business, et cetera.

But we're seeking a non-theoretical, non- "just", purely pragmatic test, so that alone would not be an argument against the economic-success test.

Also—to use the dental analogy in another context—if a certain man wants to be a dentist, and has never

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had the opportunity to study the subject, but sets himself up as a dentist, and wants to work on your teeth . . . why shouldn't he? Is it his fault he never had an opportunity to go to dental school? Why shouldn't he start trying out his own, original ideas on your teeth . . . ?

Are you being unfair to him if you refuse to allow him to practice on you?

And are you being unfair when you refuse to allow a man who never had an opportunity for an adequate education to practice on your nation's affairs? Look, friend—this business of running a nation isn't a game of patty-cake; it's for blood, sweat and tears, you know. It's sad that the guy didn't have all the opportunities he might have . . . but the pragmatic fact is that he didn't, and the fact that he can't make a success of his own private affairs is excellent reason for taking the purely pragmatic, nontheoretical position that that is, in itself, reason for rejecting his vote on national affairs.

There's another side to this progmatic test, however; neither Abraham Lincoln, George Washington Carver, nor Thomas Edison ever had an adequate opportunity for education. The guy who bellyaches that his failure in life is due to lack of opportunity has to explain away such successful people as those three before he has any right to blame all his misfortunes on the hard, cruel world around. Those three individuals all get the vote, aristocrats, and formal intellectualists to the contrary notwithstanding. One un (formally) educated frontiersman, one Negro born a slave, and one nobody who never got beyond grammar school; three properly qualified Rulers. They made a success of their private affairs; let them have a hand in the nation's affairs. We do not care who their parents were; we need not concern ourselves with their children, for the children will vote only if they, themselves make a success of their own private affairs.

Let's make the Test for Rulers simply that the individual's earned annual income must be in the highest twenty per cent of the population. This automatically makes them a minority group, selected by a pragmatic test. It bars no one, on any theoretical or rationalized grounds whatever; any man who demonstrates that he can handle his private affairs with more than ordinary success is a Voter, a Ruler.

The earned-annual-income figure might be determined by averaging the individual's actual income over the preceding ten per cent of his life, taken to the nearest year. Thus if someone eighteen years old has, for two years, been averaging in the top twenty per cent—he votes. He may be young, but he's obviously abnormally competent. The system also lops off those who are falling into senility. It automatically adjusts to inflation and/or recession.

It isn't perfect; remember we're designing Utopia, not Heaven. We *must not* specify how the income is

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earned; to do so would put theory-rationalizations back in control. If a man makes fifty thousand dollars a year as a professional gambler—he votes. Anybody who guesses right that consistently has a talent the nation needs.

There may be many teachers, ministers, and the like, who by reason of their dedication to their profession do not make the required income level. If they're competent teachers and ministers, however, they'll have many votes—through their influence on their students or parishioners. If they're incompetent, they will have small influence, and deserve no vote.

The economic test does not guarantee benevolence; it does guarantee more-than-average competence, when so large a number as twenty per cent of the population is included. And while it doesn't guarantee benevolence—it provides a very high probability, for each successful man is being judged-in-action by his neighbors and associates. They would not trade with him, or consult him, if his work were consistently injurious.

There are exceptions, those eternally-puzzling areas of human disagreement between sincerely professed theory, and actual practice. Prostitution is perhaps the clearest example; for all the years of civilized history, prostitution has been condemned. It's been legislated against, and its practitioners scorned . . . by the same population that, through all the years of civilized history have continued to support in action that ancient and dishonored institution.

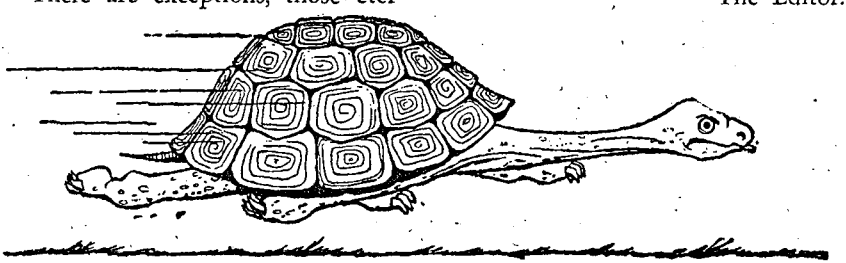
The people who voted to keep Prohibition on the books were also those who contributed to the high income of bootleggers.

There are many such areas of human ambivalence; no theoretical or rational solution appears to be in sight. The simple fact remains that, by popular vote-in-action, not in theory, prostitution, illegal gambling, and various other socially-denounced institutions continue to win wide popular support.

So . . . Utopia still won't be Heaven. But maybe we can say it will never be a Blue Nose Hell, either!

O.K., friends—now it's your turn!

The Editor.



Behold the tortoise: He maketh no progress unless he sticketh out his neck

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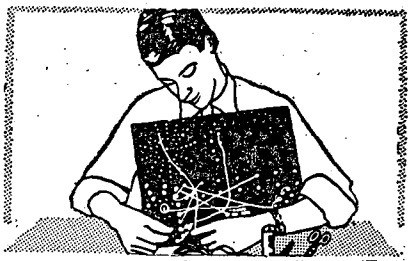

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AMERICAN BASIC SCIENCE CLUB

Sensational LOW COST SCIENCE LAB

NOW over 110 fascinating projects with

SOUND · ELECTRICITY · HEAT · ELECTRONICS · LIGHT · ATOMIC ENERGY

COMPLETE LABORATORY COMES IN 8 KITS, ONE A MONTH SUPPLIES ALL THE EQUIPMENT FOR ALL THE FOLLOWING:

ELECTRICAL EXPERIMENTS
Educational fun with Electro-Magnets, Transformer, Galvanometer, Rheostat, Relay, Voltmeter, Wheatstone Bridge, and other electric equipment.

RADIO RECEIVER
Three Tube Short Wave (80 Meter) and Standard Broadcast Receiver. Sensitive Regenerative Circuit uses regular 115 volt AC. Complete with Head Set.

DC POWER SUPPLY
Power Transformer, Vacuum Tube Rectifier and 20-20 mfd. Capacitor Filter Circuit. Converts home AC to the DC required for Electronic Circuits.

PHOTOELECTRIC EYE
Photoelectric Cell, Exciter lamp — and Electronic Relay. Everything you need to control motors, bells, alarms, and do other light beam experiments.

MICROPHONE
A sensitive carbon-button microphone that greatly amplifies unsuspected noise. Also adaptable for use with your radio transmitter.

ELECTRONIC EXPERIMENTS
Explore functions of vacuum tubes and other electronic components. Build an Electronic Switch—Amplifier, and other experimental circuits.

CODE PRACTICE SET
Signal Oscillator, Key and Flasher ... the complete outfit to learn to receive and transmit the Morse Code ... the first step to a Ham License.

STROBE LIGHT
A variable pulse neon lamp. "Freezes" motion of rapidly vibrating or rotating objects for close study and checking frequencies, RPM.

BROADCAST TRANSMITTER
Sends clear transmissions of both code and voice to nearby radios. Can be used with your microphone, record player, or code oscillator.

RADIO SERVICE EQUIPMENT
All the parts to build your own Radio Signal Tracer and a Probe Light Continuity Tester. Both pieces are invaluable in radio servicing.

SOUND EXPERIMENTS
Laboratory demonstration of sound waves, resonance and pitch. Includes Variable Frequency Oscillator, Sonometer and Ripple Tank.

TELESCOPE
A mounted astronomical Telescope. High quality ground lenses enable you to examine details of the moon's surface and distant objects.

PHOTOGRAPHY LAB
Complete dark room equipment: Printer — Enlarger — Electronic Timer — Safe Light — Developing Trays and supply of paper and chemicals.

SLIDE PROJECTOR
Takes 16mm and 35mm slides, sharp focusing, convection cooled. G.E. Projection lamp included. Also adaptable as a Projection Microscope.

MICROSCOPE
High and low power, precision ground lenses. Substage Light and Polarizer. Adaptable for photomicrography in connection with Photo Lab.

SPECTROSCOPE
Fascinating optical instrument used to identify and analyze substances by observing the spectrum of their flame. Spectrum charts are included.

ATOMIC RADIATION EXPM.
A variety of projects using Spinthariscope and sensitive Electroscope. Sample sources of radioactive Uranium Ore and Radium are included.

ATOMIC CLOUD CHAMBER
See illuminated tracks of speeding nuclear particles emanating from radioactive Alpha source and mysterious cosmic rays from outer space.

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Produce dazzling color effects with invisible "black light". Used extensively for crime detection, mineralogy and science. Fluorescent Ink, Crayon and Tracer Powder are included.

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Study the Molecular Theory of heat using 2 Thermometers, Thermostat, 3 foot Gas Thermometer and special Microscope arrangement that shows the effect of Molecular Movement.

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Aneroid Barometer, Cup Anemometer that electronically measures wind speed. Sling Psychrometer, Humidity Gauge, Cloud Speed Indicator, Cloud Chart and Weather Map.

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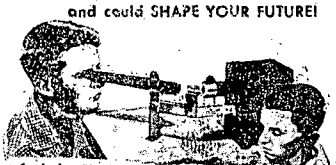
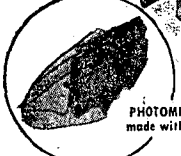


Analyzing Glowing Gases with the SPECTROSCOPE

Trouble Shooting with the SIGNAL TRACER



PHOTOMICROGRAPH of a Fly's Wing made with Microscope and Photo Lab (Actual Size 5" diameter)

SEND ONLY **$2.00** WITH COUPON — PAY ONLY **$3.45** FOR EACH KIT YOU RECEIVE (ONE A MONTH FOR 8 MONTHS)

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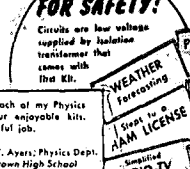
FOR SAFETY! Circuits are low voltage supplied by isolation transformer that comes with the Kit.



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